Dupuytren’s Disease Symposium

Saturday, April 17th, 2010

Presented by
STONY BROOK UNIVERSITY MEDICAL CENTER
DEPARTMENT OF ORTHOPAEDICS

Sponsored by
OFFICE OF CONTINUING MEDICAL EDUCATION

Location:
State University of New York at Stony Brook
Health Sciences Center
Level 2, Lecture Hall 1
PROGRAM OVERVIEW

Dupuytren’s contracture affects three to six percent of the world’s Caucasian population. The flexion contracture is a serious impediment to normal hand function and can interfere severely with activities of daily living. The goal of the conference is to convene a wide array of world experts to discuss the basic science, pathoanatomy, surgical and non surgical treatment options for Dupuytren’s contracture.

TARGET AUDIENCE

This conference targets basic scientists, hand surgeons, rheumatologists and hand therapists. We will present up to date evidence based on information pertaining to recognition and surgical and non surgical management of Dupuytren’s contracture. The relevance is to hand surgeons, orthopaedic and plastic surgery residents and fellows, physicians assistants, nurse practitioners and nurses and hand therapists who will benefit from the topics discussed.

PROGRAM OBJECTIVES

Upon completion of the activity, participants should be able to discuss all aspects of the flexion contracture disorder to include:

- Describe history of the disease
- Discuss basic science of the disease
- Describe normal and pathologic anatomy of the palm/hand/finger/cords
- Clinically assess and diagnose the disease
- Have a strategy regarding the surgical treatments including:
  - Open fasciectomy
  - Segmental fasciectomy
  - Dermatofasciectomy
- Perform postoperative management
- Prescribe hand therapy
- Recognize surgical complications
- Manage disease recurrence
- Have a strategy for performing and identifying needle fasciotomy/complications
- Have a strategy for performing and identifying Collagenase injection therapy/complications
- Recognize complex cases- surgical and nonsurgical
- Perform patient education
- Discuss future research directions

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# Dupuytren’s Disease Symposium

**April 17, 2010**

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Dupuytren’s Disease Symposium

History of Dupuytren’s Disease
Peter Murray, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Provide historical background of Dupuytren’s Disease and its impact on current treatment of the condition as well as diagnosis of the condition.

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Dr. Peter Murray, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
History of Dupuytren’s Disease: Curses, Coachmen, Controversies and Characters

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Dupuytren’s Disease Symposium
Stoney Brook University Medical Center
Dept. of Orthopaedic Surgery
17 April 2010

Introduction

• Ancient History
• Medieval History and the “Curse”
• “Coachmen” and “Controversy”
• The “Characters”
Ancient History

• Speculation in ancient times of Dupuytren’s as a cause of finger contractures
  • RA
  • gout
  • Trauma
  • Ulnar nerve palsy
• Gesture of “legality/truth”
• No record in Greek or Roman literature of DD

Ancient History

• Benediction symbol of the early church
  • Mosaic of the Deesis (1261)
    • Hagia Sophia Basilica, Istanbul
  • Superimposition of a Roman gesture? (Tubiana)
Ancient History

- Sagas of Iceland (10th-11th century)
  - Miracles of the Priests of Orkney
  - Siguror from Shetland
  - The Saga of Guomundr the Priest
  - Servant with fingers clinched in palm
  - Father Guomundr slammed foot against the footboard in protest of slow message, the hand was caught and the servant cured
  - Forced fasciotomy

Altar cloth from Cathedral of Holar in North Iceland.

Medieval History and the “Curse”

- Albrecht Durer’s praying hands 1508
Medieval History and the “Curse”

- 1614 Felix Plater of Basil
  - Earliest medical report of finger flexion deformity
    - Observationum
  - Stone mason
  - Ring and small
  - Progressive
  - Oils, splinting
  - Didn’t speculate on cause

The “Curse of the MacCrimmons”

- Preeminent bagpipe players of Scotland
- Most bagpipe music that has endured was composed by this clan
- They were “cursed” by a condition that bent the small finger—rendering bagpipe playing impossible……
- Many current pipers have their ancestry tied to this clan and they have a higher incidence of DD
“Coachmen” and “Controversy”

• 1777– Cline of London dissects 2 cadavers with contracture
  • Records involvement of the palmar fascia. “Feels like a very hard cord.”
  • Comments that it is a disease of “laborious people”
  • “Proposed” an operative cure, recognized danger to vessels/nerves

• 1822– Cooper of London distinguished between contracture of flexor tendons and the palmar fascia
  • “When the thecae is contracted, nothing should be attempted for the patients relief”
  • “But when the aponeurosis is the cause, it may be with advantage divided by a pointed bistoury”
“Coachman and Controversy”

- Cooper was often misquoted in the Paris medical community as saying the disease was “incurable”
  - Fueled Dupuytren’s passion??
- Confusion existed in Paris as to the cause of DD.
  - Tendon v. sheath v. palmar fascia
- 1826– Boyer and others attributed the contracture to “crispatura tendinum”
  - Unexplained drying, hardening and stiffing of tendons and skin
  - Warned against the practice of dividing the tendons

“Coachman and Controversy”

- 1831– A pupil of Boyer refers a wine merchant with finger contractures to Dupuytren, remembering Boyer’s advice
  - Senior surgeon of Hotel Dieu
  - The greatest Paris surgeon
- Dupuytren performed the first fasciotomy, reported his findings in a lecture/surgical demonstration at the Hotel Dieu 5 Dec 1831
"Coachmen" and "Controversy"

- 1834—Dupuytren's 1831 lecture published in Lancet
  - Chides previous authors who have "spoken incompletely" on the subject
  - Failed to acknowledge Cooper for the original description of disease
  - Associated the condition with trauma
    - "the greater number have been obliged to make efforts with the palm of the hand"
  - Dismissed other etiologies
  - crispatura tendinum
  - Describes disease progression/cord
  - Predilection for the ring finger
  - "Lifting of palmar skin"
  - Normality of the joints, but painful

Coachmen and Controversy

- Reviews/dismisses previous treatments as unsuccessful
  - 150 lb weight attached to the finger
  - Fumigations, leeches, mercury, sulfur douches, and splinting
  - Division of flexor tendons (2 cases)
    - patient almost died of sepsis
    - Finger remained flexed
“Coachmen” and “Controversy”

• Followed dying man with DD in order to obtain his arm upon death
  • “I had kept my eye on him for some years, and was determined not to lose this opportunity of investigation”

Coachmen and Controversy

• 2 Cases
  • Case 1-Wine Merchant
    • 3 incisions
    • Finger straightened
    • Incisions left open
    • Post-operative extension splinting
      • “Palmar inflammation”
      • Blamed on splint, likely sepsis
“Coachmen” and “Controversy”

• Case 2- The “coachman” (Demarteau), age 40 yrs
  • Palmar fasciotomies
  • Emphasized that the holding of the whip in the hand was the chronic trauma that caused the condition
• Disease of palmar fascia

“Coachmen” and “Controversy”

• 1833--Goyrand and Velpeau challenged Dupuytren’s explanation of the condition
  • Goyrand’s meticulous dissections
  • More disseminated disease
  • Criticized Dupuytren’s cases as “localized” or “limited”
  • Claimed tendon and palmar fascia were normal
  • Cited “new fibrous tissue” as the cause
    • “pre-digital bands”
  • Reported on a different “coachman” with bilateral disease
  • Noted that the coachman held the whip in one hand only…. 
The “Characters”

• Henry Cline (1750-1827)
• Sir Astley Paston Cooper (1768-1841)
• Baron Alexis Boyer (1757-1833)
• Alfred Armand Louis Marie Velpeau (1765-1867)
• Jean-Gaspard Blaise Goyrand (1803-1866)
• Baron Guillaume Dupuytren (1777-1835)

Henry Cline

• Identified involvement of palmar fascia
• Preeminent London Surgeon
• Trained under John Hunter, the “father of British surgery”
• Surgeon at St. Thomas Hospital
• President, Royal College of Surgeons
• Devoted family man
• Little desire to write…
• Obituary remarks:
  • Cheerfulness, mildness, and kindness of disposition
  • Second to no one in operative skill and judgement
  • Patients looked upon him as “friend”
  • Many friends
Sir Astley Paston Cooper

- First description of disease
  - Tendons v. fascia
- Trained under Henry Cline
  - Partnered with Cline for 22 years
- Son of a clergyman
- Surgeon to Guy's Hospital
- Popular anatomy lecturer
  - Maintained cadavers at home
  - Dissected something everyday
  - Lectured on his wedding day
- Devoted one hour daily to the care of the poor
- Sergeant Surgeon to Queen Victoria
- President, Royal College of Surgeons

Baron Alexis Boyer

- Referred first patient surgical patient to Dupuytren.
- Consulting surgeon to Charite Hospital, Paris
- Previously second surgeon at Hotel Dieu
- Chair, clinical surgery at the U of Paris
- Son of a tailor
- Known for anatomical knowledge and dexterity
- “Cautious and finicky” surgeon
- Ultimately promoted by Napoleon to “Imperial Family Surgeon”
Alfred Armand Louis Marie Velpeau

- With Goyrand, challenged Dupuytren’s theories on the cause of the condition
  - Development of new fibrous cords
- Successor to Boyer at the University of Paris
- Renowned anatomist
- Published 340 articles
  - Surgery
  - Obstetrics
- Velpeau bandage sling
- Believed “pain free surgery was a fantasy”

Jean-Gaspard Blaise Goyrand

- Meticulous surgeon and anatomist
- Swiss born, French physician who trained in Paris
- Consulting surgeon to the Hotel Dieu
- Later “deputy-mayor of Aix-en-Provence”
  - Rue Goyrand
Baron Guillaume Dupuytren

• Son of a lawyer
• Grandfather and two uncles were surgeons
• Wanted to join the army, but his father wouldn’t let him, rather, sent him to Paris to become a surgeon
• Assistant surgeon under Phillippe Pelletan at Hotel Dieu (at only age 25!)
  • Had many conflicts with Pelletan

Baron Guillaume Dupuytren

• Later named head surgeon to Hotel Deiu (age 38)
• Preeminent Paris surgeon for the next 20 years. “Age of Dupuytren” in Paris medicine....
• Admired as great surgeon and teacher, his powers of diagnosis were legendary
• Some of Dupuytren’s original descriptions:
  • CDH
  • Fractures of the distal fibula
  • Madelung’s deformity
  • Post-traumatic shock
  • Burn classifications based on depth
  • Self mutilation of the genitali
Baron Guillaume Dupuytren

• However, his personality aroused many enemies....
  • Lisfranc, “the brigand (bandit) of the Hotel Dieu” and “the frog at water’s edge” (habit of wearing a green coat)
  • Percy, “the greatest of surgeons and the least of men.....”

Baron Guillaume Dupuytren

• Biographers have described him as:
  • Cold
  • Ruthless
  • Overweeningly ambitious
  • Contemptuous of his superiors
  • Contemptuous of his subordinates
  • Unscrupulous
  • Overbearing
  • More respected than beloved
  • Nobody’s friend.....
Baron Guillaume Dupuytren

- For Dupuytren there was no holiday
  - He once told his adjunct surgeon at the Hotel Dieu, “When I am away or ill, I expect you to act as my substitute, but I warn you, I am never away and never ill….”
- He arrived at the hospital at 0600
  - Bell would ring and ward rounds began, usually lasting 3 hours
  - Next delivered daily lectures from his high backed chair and wearing his green coat, to some 500 students and doctors
  - Spoke in a low voice to command attention
  - Surgery then followed
    - Deliberation over brilliance
    - Safety over slight of hand
  - In 1818 he performed 764 major surgeries

Baron Guillaume Dupuytren

- Next outpatient evening clinic for free consultation
  - Showed same attentiveness to the indigent as he did the rich…..
  - Would return to the hotel Dieu to make post-op rounds 7-8 pm
  - The rest of the evening devoted to the laboratory and private consultations
Baron Guillaume Dupuytren

- 1833—Dupuytren suffered a stroke which affected his speech
- 1834—He took his first vacation, a trip to Italy
- 1835—Developed pleurisy and died while his colleagues debated about whether to drain the empyema, no doubt influenced by Dupuytren’s earlier remarks:
  - “It is better to die of the disease, than of the operation…”

Summary

- Benediction sign in the early church may have been influenced by DD
- First medical writings on finger contractures were in 1614 by Plater
- Cline and Cooper were the first to describe the condition in any detail. Both were kindly regarded by biographers of the day
- Dupuytren was brilliant but not kindly regarded by biographers of the day
- All of the early writers felt that DD was a condition caused by trauma
Thank You

Hand and Microvascular Surgery Service
Mayo Clinic
Jacksonville, FL

Dupuytren's Disease in Women

• Best known prevalence study:
  • Mikkelsen et al, Acta Chir Scand, 1972
  • Haugesund, Norway
  • 16,000/27,015 residents participated
  • Response: 71% men, 82% women
  • Prevalence: 9.4% ♂, 2.8% ♀
  • Increases in 5th decade for men and 6th decade for women
  • Max: 36.8% age 70-74 for men, 25% age 85-89 for women
  • Bilateral: 59% ♂, 43% ♀
Dupuytren’s Disease in Women

• General agreement:
  • Higher prevalence of DD in males
  • DD has its peak onset a decade later in females
  • Increased risk of women developing CRPS compared to men following surgery for DD
    • McFarlane et al, 1985
      • 3.5% men, 7% women
    • Incidence of recurrence similar men v. women

• Degreef et al, Acta Ortho Belgica, 2008
  • 65 women, mean age=50 yrs
  • F/U=7yrs, 7 mo
  • Recurrence 42%
  • Bilateral 54%
  • Small 77%, ring 48%, index 14%
  • Family history 55%
  • 22% smokers, 32% manual laborers
  • Shoulder pain/frozen shoulder 54%/45%
  • High cholesterol 39%
  • DM 6%
  • Seizure disorder 5%
Dupuytren’s Disease in Women

• Degreif et al, Acta Ortho Belgica, 2008
  • Risk factors: chol, smoking, labor
  • Frozen shoulder, high in women with DD
  • High recurrence, related to aggressive course
  • High family history
  • High bilateral disease
  • High assoc with Ledderhose disease

Dupuytren’s Disease in Women

• Anwar et al, JHS, 2007
  • 109 women, 119 hands
  • 63 years of age
  • 34 MCP DD; 66 PIP DD
  • Ring/small most often affected digit
  • Mean pre-op MCP=35°/post-op=1°
  • Mean pre-op PIP=42°/post-op=7°
  • Recurrence=22%
Dupuytren’s Disease in Women

• Anwar et al, JHS, 2007
  • Symptomatic presentation similar to men
  • PIP involvement more severe than MCP
  • Similar recurrence rate to men
  • Surgical outcome similar to men

Modern Era

• 19th century-WW II: surgeons treated only the palmar DD, rarely treating PIP joint contractures
• James and Tubiana (1952) reported on the complications of extensive fasciectomy (hematomas, skin necrosis)
Modern Era

- McIndoe and Beare (1958): Excision of digital lesions through use of Z-plasty

Modern Era

- Charles R McCash (1901-1979): described open palm technique to eliminate hematoma’s, 1964
  - Consultant, Plastic Surgery, Queen Mary’s Hospital, Roehampton, London
  - BMJ Obituary: “Great kindness and understanding,” “family man,” “Daddy McCash”
Modern Era

• John Hueston (1926-1993)
  • Plastic surgeon, born in Australia
  • Trained with McIndoe in England
  • Contributed to understanding of "genetic predisposition of the DD"
  • 70 papers on DD, many chapters and books
  • Despite vast surgical experience he stated in one of his last lectures, "I have a dream, that one day DD will be treated without surgery."

Modern Era

• Robert M. McFarlane (1927-2006)
  • Extensive writing on epidemiology of DD
  • St. Josephs Health Center, London, Ontario, Canada
  • Lou Marsh Trophy for Canada’s best athlete, 1950 (track and field)
  • Demonstrated the DD followed anatomic structures rather than amorphous fibromatosis
  • Only 1 of 2 Canadians to be President of ASSH
Dupuytren’s Disease Symposium

Cellular Biology & Growth Factors in Dupuytren’s Disease
Marie Badalamente, Ph.D.

Educational Objectives

Upon completion, participants should be able to:

• Review the identification of the myofibroblast in Dupuytren’s disease (DD) and its importance to the pathogenesis
• Discuss the interconnecting roles of cytokines, such as IL-1 and growth factors, such as TGF-β, in the pathogenesis of DD
• Name the cellular/structural identifiers of the myofibroblast
• Explain how certain cytokines and growth factors induce myofibroblast proliferation

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Auxilium Pharmaceuticals: Research Support, Consultant
Biospecifics Technologies Corp.: Intellectual property rights, (future) partial royalties
“FACTORS” IN DUPUYTREN’S DISEASE

Marie A. Badalamente, PhD
Dept. Orthopaedics
SUNY@Stony Brook

Fibrogenic Growth Factors, Cytokines+
Collagenases (MMPs) and Inhibitors (TIMPs)

- Induce fibroblast proliferation
- Induce differentiation to myofibroblasts
- Stimulate production of extracellular matrix
### Molecular Changes

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<tr>
<th>Growth Factors and Cytokines</th>
<th>IL-1α, IL-1β, TGF β (1,2,3), β FGF, EGF, EGFr, NGF</th>
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<td>Extracellular Matrix and associated proteins</td>
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<td>TIMP (1,2), MMP1,2,14, ADAM12, ADAMTS14, BMP4</td>
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<td>Other</td>
<td>Lysophosphatic acid (LPA), Androgen receptors, Mafβ, Prostaglandins, HLA-DR1*15, Epidermal dendritic cells, Activated T cells</td>
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### “Higher Levels” (Nodule)

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"Higher Levels" (Cord)

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<tr>
<td>Matrix metalloproteinases and associated proteins</td>
<td>TIMP (1,2), MMP2, ADAM12, ADAMTS14, BMPs</td>
</tr>
<tr>
<td>Other</td>
<td>Lysophosphatic acid (LPA), Androgen receptors, Mafβ, Prostaglandins, HLA-DR1*15, Epidermal dendritic cells, Activated T cells.</td>
</tr>
</tbody>
</table>
Stages

- Proliferative
- Involutional
- Residual

Luck, JV. 1959. JBJS, 41A:635-64


The Myofibroblast

The Fibronexus

- Trans-membrane adhesion complex
  - α smooth muscle actin--fibronectin
  - α 5 β1 integrin receptor

Pathogenesis
Proliferation/Apoptosis?

- Fibroblast to myofibroblast differentiation
  - TGFβ1 upregulates α smooth muscle actin gene expression = proliferation

- Induction of apoptosis
  - By IL-1β via induction of nitric oxide synthase = cell death

  BUT

- Protection from apoptosis
  - TGFβ1 inhibits IL-1β induced apoptosis = proliferation

- Protection from apoptosis
  - Endothelin-1

**Pathogenesis?**

**Oxidative Stress?**

- Genetic “predisposition”

- Ischemic effects of smoking/diabetes/trauma?/aging
  - conversion of ATP to hypoxanthine
  - conversion of xanthine dehydrogenase to xanthine oxidase
  - Xanthine oxidase induces oxidation of hypoxanthine to xanthine with free radical release

- Alcohol effect
  - Enzyme effects (as above)
  - Increased **Lysophosphatidic acid (LPA)** levels (from lipid metabolism)

- Phenobarbitone (epilepsy) effect
  - Increased cholesterol metabolism—increased LPA levels

---

**Oxidative Stress?**

- **Free Radical Effects**
  - proliferation of fibroblasts
  - production of cytokines—**IL-1**

- **IL-1** (increased levels)
  - fibroblast proliferation (dual stimulation/apoptosis?)
  - Stimulates platelets and macrophages to produce growth factors (TGF-β, PDGF, FGF, EGF)

---

Oxidative Stress?(cont)

- **TGF-b1 effects**
  - differentiation of fibroblasts to myofibroblasts
  - increased ECM
  - splicing of fibronectin
  - activation of platelets to produce LPA

Oxidative Stress?(cont)

- **LPA**
  - From (normal) lipid metabolism
  - From “alcohol effect”
  - From TGF-b platelet activation
    - Binds to myofibroblast receptors
    - Aids in myofibroblast contraction*
  - From degradation of cell membrane (sphingomyelin and phosphatidylcholine)

Current and Future Research

- Wingless (Wnt) β- catenin pathway
  - β-Catenin expression is elevated in cells during the proliferative phase of wound healing, and it is overexpressed in conditions of fibroblast hyperproliferation
  - implicated in DD pathogenesis
  - Type 1 collagen as a regulator of β- catenin accumulation and modifier of TGF β1 signaling
Educational Objectives

Upon completion, participants should be able to:

- Identify the histological and biochemical characteristics of the myofibroblast.
- Describe components required for myofibroblast force generation and transmission.
- Describe how matrix stiffness regulates myofibroblast formation and function.
- Compare and contrast tissue contraction versus contracture.

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1. Critical event in DD is shortening of the palmar fascia leading to irreversible flexion of digits
2. Two main questions:
   - What is initiating event that leads to pathological shortening of palmar fascia?
   - How is palmar fascia shortened leading to irreversible flexion?
3. Initiating event that leads to shortening is still unclear
4. Beginning to gain an understanding of cellular and molecular mechanisms leading to pathological shortening of palmar fascia
**Learning Objectives**

1. Identify the histological and biochemical characteristics of the myofibroblast
2. Describe components required for myofibroblast force generation and transmission
3. Describe how matrix stiffness regulates myofibroblast formation and function
4. Compare and contrast tissue contraction versus contracture

---

**FIBROBLAST**

1) Cortical meshwork of actin microfilaments
2) β- and γ- cytoplasmic actin

**MYOFIBROBLAST**

1) Stress fibers
2) Fibronexus adhesion complexes (vinculin)
3) Fibronectin fibers
4) β-actin, γ-actin, smooth muscle α-actin
   SM γ-actin, SM22-α, h1-calponin
Stage-Specific Distribution of Myofibroblasts in Dupuytren’s Disease

- **Proliferative stage:** mainly fibroblasts, some myofibroblasts
- **Involutional stage:** many myofibroblasts in nodule
- **Residual stage:** mainly fibrotic with few fibrocytes

Involutional stage Dupuytren’s disease stained for SM α-actin

### DD Involves Remodeling of Extracellular Matrix

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Proliferative</th>
<th>Involutional</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myofibroblasts</td>
<td>None</td>
<td>Some</td>
<td>Many</td>
<td>Very few</td>
</tr>
<tr>
<td>Type III collagen*</td>
<td>Little</td>
<td>Some</td>
<td>Lots</td>
<td>Little</td>
</tr>
<tr>
<td>ED-A fibronectin**</td>
<td>None</td>
<td>Some</td>
<td>Lots</td>
<td>Little</td>
</tr>
<tr>
<td>Periostin***</td>
<td>None</td>
<td>Little</td>
<td>Lots</td>
<td>Little</td>
</tr>
</tbody>
</table>

Presence of type III collagen, ED-A FN and periostin indicative of remodeling at involutional stage

*Brickley-Parsons et al 1981 JBJS 63:797-797
**Halliday and Tomasek 1994 JHS 19:428-434
***Vi et al 2009 ECR 315: 3574-3586
Myofibroblasts Contain Stress Fibers and Focal Adhesions

Stress fibers – red
Focal adhesions – green

Transmission electron micrographs
Fibronexus in DD

Myofibroblasts Can Contractile Collagen Matrices

Attached Collagen Lattice

Culture DD myofibroblasts 5 days

Release

DIAMETER

TIME (MIN)

RELATIVE LATTICE DIAMETER

No FBS

10% FBS
Smooth Muscle $\alpha$-Actin Expression Directly Correlates with Force Generation

Wrinkling correlates with SM $\alpha$-actin immunostaining

Force generation correlates with SM $\alpha$-actin expression


FIBROBLAST

1) Cortical meshwork of actin microfilaments
2) $\beta$- and $\gamma$- cytoplasmic actin

MYOFIBROBLAST

1) Stress fibers
2) Fibronexus adhesion complexes (vinculin)
3) Fibronectin fibers
4) $\beta$-actin, $\gamma$-actin, smooth muscle $\alpha$-actin

How does contractile force generated by myofibroblasts result in digital flexion?
Matrix Remodeling (Shortening) by Myofibroblasts

Myofibroblast contraction
Contraction phase

Matrix degradation
Remodeling phase

Matrix deposition
Contracture phase

Shorter ct matrix

Fibroblast
Mechanical Tension

Proto-Myofibroblast

Differentiated Myofibroblast

Increased Scarring Occurs With Skin Tension

Risk of keloid formation
Risk of poor aesthetic healing
Risk of secondary infection
Stable changes and absence of granulation

Scar contracture

Model For Mechanoregulation

Compliant Matrix
Fibroblast

G-actin

MRTF-A

SRF
No SMAA

No SRF Activation

Stiff Matrix
Myofibroblast

F-actin

MRTF-A

SRF Activation

SRF
SMAA

MRTF-A – myocardin related transcription factor-A
SRF – serum response factor
SMAA – smooth muscle α-actin


MRTF-A Expression Levels Can Affect the Myofibroblast Contractile Phenotype

Not Contractile Fibroblast

Contractile Myofibroblast

INCREASED levels of

SM α-Actin
SM γ-Actin
SM22α
h1-calponin
MRTF-A Expression Levels Can Affect the Myofibroblast Contractile Phenotype

**Knockdown MRTF-A**

- Not Contractile Fibroblast
- Contractile Myofibroblast

**DECREASED levels of**

- SMα-Actin
- SMγ-Actin
- SM22α
- h1-calponin

---

**Positive Feedback Loop**

- Increased expression of SMα-actin promotes increased cell tension and F-actin assembly
- Promote and stabilize myofibroblast formation and function
Summary

1. Myofibroblasts are present during involutional stage of disease
2. Myofibroblasts contain stress fibers and focal adhesions capable of generating contractile force and transmitting to surrounding extracellular matrix
3. Mechano-regulated expression of SM-specific contractile proteins occurs via actin dynamics and subsequent localization of the transcription factor MRTF-A
4. Myofibroblasts remodel matrix and maintain tissue integrity (contraction) as a new shorter matrix is deposited (contracture)

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University of Toronto
Boris Hinz

University of Houston
Robert Schwartz

University of Virginia
Gary Owens

OUHSC Collaborators
Eric Howard
Ghazi Rayan
Dupuytren’s Disease Symposium

Associated Diseases
Ghazi Rayan, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Discuss the importance of social habits, physiologic conditions, systemic diseases, trauma and ectopic Dupuytren’s tissue as associated conditions to Dupuytren’s disease.

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Associated Conditions With Dupuytren’s Disease

Ghazi Rayan MD
Oklahoma City
Oklahoma

Presenter Disclosure Information

No benefits have been received or will be received from a commercial party related directly or indirectly to the subject of this presentation.
Associated Conditions

I. Social habits
II. Physiologic conditions
III. Systemic diseases
IV. Trauma
V. Ectopic Dupuytren’s disease

I. Social Habits

Legal drugs
• Smoking
• Alcohol
Social Habits

**Smoking:**
- Strong positive correlation with DD
- Microvascular insufficiency and decrease blood flow to the hand

Van Aldrichem et al 1992
An H et al 1994
Burge et al 1997

Social Habits

**Alcoholism:**
- Link between alcohol intake and DD
- DD more prevalent (39%) among A than controls (23%)
- Mechanism is unclear
- Alcoholics tend smoke heavily
- Influence alcohol has on
  - liver disease
  - lipid metabolism

Dupuytren 1831
Shaumann 1938
Skoog 1948
Wolfe et al 1956
Hueston 1960
Bradlow et al 1986
Attali et al 1987
Noble et al 1992
Carson-Clarke 1993
Burge et al 1997
Social Habits

Environmental Factors:

• Hasten the disease onset
• Influence its course and progression
• Unlikely have any role in disease etiology

II. Physiologic Conditions

Palmaris longus muscle:
• Tend to be present among DD patients
• No other studies corroborated this finding

Powel 1986
Physiologic Conditions

Blood group A:
• 2 studies found higher DD than normal (1,2)
• 1 study did not support this finding (3)

1. Von Speiser – Millesi 1964
2. Medori 1982
3. Mikkelsen 1967

Adipose tissue
• DD patients have less subcutaneous fat in palm and triceps skin fold than normal controls
• DD palmar fat has higher cholesterol ratio

Rabinowitz, Osterman et al 1983
Flint, McGrouther 1990
Bergenudd et al 1993
III. Systemic Conditions

- Hypercholesterolemia
- Diabetes Mellitus
- Epilepsy
- AIDS
- Stenosing tenosynovitis
- Rheumatoid disease
- Compression neuropathy

**Systemic Conditions**

**Hypercholesterolemia:**
- Significant relationship lipid metabolism
- 54 % of DD $\rightarrow$ hypercholesterolemia
- 77 % of DD $\rightarrow$ arcus cornealis senilis

Hillemand et al 1975
Caroli et al 1992
Sanderson et al 1992
Systemic Conditions

Diabetes

- Numerous studies confirmed that DD is prevalent among diabetic patients

Gayla & Vigor 1884
Von Paeslack 1962
Schneider 1964
Montenero et al 1965
Wegmann 1966
Merle 1970
Mikkelsen 1979
Fossati et al 1982
Noble et al 1984
Pal et al 1987
Quintana 1988
Chammas et al 1995
Arkkila et al 1997

Systemic Conditions

Diabetes

- Wide variation DD incidence (2 - 63%) among diabetics
- No gender difference

Most cases
- Mild
- Non progressive
- Nodular disease limited to the palm

Fossati et al 1982
Noble et al 1984
Chammas et al 1995
Systemic Conditions

**Diabetes**
- DD incidence is related to
  - Duration diabetes
  - Patients age

Gayla & Vigor 1884
Mikkelsen 1979
Noble et al 1984
Pal et al 1987
Arkkila et al 1997

Systemic Conditions

**Diabetes**

Incidence of DD vs. age in diabetic population

Mikkelsen 1979
Hurst and Badalamente 1990
Systemic Conditions

Diabetes

“Perhaps diabetic DD is different disease from the nondiabetic one”

Chapter “Associated Diseases”

Hurst & Badalamente 1990

- The reason for the high prevalence of DD among diabetics and its different presentation is unclear

- Most likely because some diabetics have Non-Dupuytren disease pattern of palmar fascial proliferation

Rayan 1999
Rayan et al 2005
Systemic Conditions

Epilepsy

• Several authors found DD to be more prevalent among epileptics (34%) than normal population
• DD tends to be more severe among epileptics
• A few studies did not confirm this relationship
• Controversy exists as to whether DD is linked to the influence of antiepileptic drugs

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lund</td>
<td>1941</td>
</tr>
<tr>
<td>Skoog</td>
<td>1948</td>
</tr>
<tr>
<td>Early</td>
<td>1962</td>
</tr>
<tr>
<td>Zachariae et al</td>
<td>1970</td>
</tr>
<tr>
<td>Pojer et al</td>
<td>1972</td>
</tr>
<tr>
<td>Arafa etal</td>
<td>1992</td>
</tr>
<tr>
<td>Brenner et al</td>
<td>1994</td>
</tr>
</tbody>
</table>

Systemic Conditions

AIDS:

• 2 studies documented higher prevalence of DD among AIDS patients compared to the general population
• Not related to hyperuricemia or gout

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>French et al</td>
<td>1990</td>
</tr>
<tr>
<td>Bower et al</td>
<td>1990</td>
</tr>
</tbody>
</table>
Systemic Conditions

**Stenosing tenosynovitis**

- Palmar nodule
- Vertical cord
- Unrelated to DD

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parker</td>
<td>1979</td>
</tr>
<tr>
<td>Burgess and Watson</td>
<td>1987</td>
</tr>
</tbody>
</table>

D nodule

A1 pulley
Systemic Conditions

Nodulectomy
• A1 pulley release

Fasciectomy
• Vertical cord excision

Septa of Legueu and Juvara

Bilderback and Rayan JHS 2004
Rayan - Hand Clinics 1999
Systemic Conditions

• Vertical cord

Systemic Conditions

Rheumatoid disease
• One report showed that RA patients have significantly lower incidence of DD than control group

Arafa et al. 1992

• Negative association between DD patients and joint complaints

Gugmundsson et al. 1999
Systemic Conditions

Rheumatoid disease

• Reported 4 patients (since have treated another 4)
• Two patients were unaware of DD diagnosis
• R flexion and ulnar deformities at MP joints may mask DD pathology
• Rheumatoid reconstruction without removing DD cord will leave residual deformity
• Surgery is staged in coexist severe diseases
• DD fasciectomy done first

DD and Rheumatoid Arthritis
DD and Rheumatoid Arthritis
Systemic Conditions

Compression neuropathy

- Ulnar tunnel syndrome  cause
- Carpal tunnel syndrome  association
Systemic Conditions

Ulnar tunnel syndrome
• One report described 2 cases
• Diseased fibrotic tissue in Guyon canal roof
• Dupuytren’s nodule within the Guyon canal

Systemic Conditions

Carpal tunnel syndrome
• No epidemiologic studies on the occurrence frequency of CTS and DD
• Reports of concurrence of these 2 conditions
• Treatment recommendations for their coexistence
• Non-Dupuytren’s disease can develop after CTR

Salzberg and Weinberg 1987

Wroblewski 1973
Nissenbaum M, Kleinert HE 1980
DD and Carpal Tunnel Syndrome

Simultaneous surgery for DD and CTS

- Should not be done because it compromises long-term results particularly among women
  
  Nessinbaum and Kleinert 1980

- Is “strongly recommended” because it does not adversely affect treatment outcome

Gonzalez and Watson 1991

Female DD and failed prior CTR with painful scar & neuroma
DD and Carpal Tunnel Syndrome

Exploration                      Perineural scarring

Partial fasciectomy               CTR                     Neurolysis
DD and Carpal Tunnel Syndrome

Palmaris brevis ST interposition

FT Skin grafting

DD and Carpal Tunnel Syndrome

DD and severe CTS with thenar atrophy
DD and Carpal Tunnel Syndrome

CTR done + modified Camitz opposition transfer from distally released PT cord

No subsequent contracture of transferred motor
IV. Trauma

- Occupational

- Acute

### Trauma

**Occupational Trauma**

<table>
<thead>
<tr>
<th>For</th>
<th>Against</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dupuytren</td>
<td>Goyrand</td>
</tr>
<tr>
<td>Mikkelson 1976</td>
<td>Moorhead 1953</td>
</tr>
<tr>
<td>De la Caffiniere 1983</td>
<td>Hueston 1960</td>
</tr>
</tbody>
</table>

No scientific evidence to support the notion that occupational hand use is causally related to DD.
Acute Trauma

- A single injury was observed by several authors to precipitate the onset of DD

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>James and Tubiana</td>
<td>1952</td>
</tr>
<tr>
<td>Clarkson</td>
<td>1961</td>
</tr>
<tr>
<td>Hueston</td>
<td>1968</td>
</tr>
<tr>
<td>Fisk</td>
<td>1974</td>
</tr>
<tr>
<td>McFarlane</td>
<td>1990</td>
</tr>
</tbody>
</table>

- Genetically predisposed patients

Acute injury or surgery that precipitate palmar hematoma will be followed by the onset of palmar fascial proliferation of non-Dupuytren’s disease

<table>
<thead>
<tr>
<th>Author</th>
<th>Journal</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rayan</td>
<td>Hand Clinics</td>
<td>1999</td>
</tr>
<tr>
<td>Rayan &amp; Moore</td>
<td>JHS B</td>
<td>2005</td>
</tr>
</tbody>
</table>
Non-Dupuytren’s Disease

• 39 patients developed Non-DD
• 28 had antecedent trauma or surgery to the hand
  – 13 wrist and hand fractures
  – 15 CTR, trigger finger, others
• 25 secondary factors:
  Diabetes, alcohol, hypercholesteremia

DD and Non-Dupuytren disease are two different clinical entities that must be recognized and differentiated
V. Ectopic Dupuytren’s Disease

- Hand
- Upper extremity
- Lower extremity
- Distant disease

Ectopic Dupuytren’s Disease

**Hand**
- Dorsal Dupuytren’s nodules
Ectopic Dupuytren’s Disease

**Upper extremity**
- Wrist (Simons, Boyes)
- Forearm (Sinha)
- Arm (Okano)
- Shoulder (Bunnell)

**Lower extremity**
- Hip and spine (Jakubowski)
- Popliteal space (Wheeler-Meals)
- Plantar fascia (Ledderhose)
Ectopic Dupuytren’s Disease

Ledderhose disease
- Occurs in 5 – 20%
- Usually asymptomatic
- Nodules
- Non weight bearing area
Ectopic Dupuytren’s Disease

Ledderhose disease
• Seldom affect toes

Hueston 1963
Gordon 1964
Reynolds et al 1975
Classen and Hurst 1992
Donato and Morrison 1996

---

Ectopic Dupuytren’s Disease

Distant disease
• Male genitals Corpus cavernosum (Peyronie)

Brenner - Rayan 2003
Ectopic Dupuytren’s Disease

Peyronie Disease
• Occurs 1 – 3%
• Under reported
• Plaque located dorsally
• Dorsal curvature

Peyronie Disease
Knuckle Pads Versus Dorsal Nodules

• Ambiguity about using the term knuckle pads in DD
• No clear distinction between dorsal knuckle pads and nodules

History

• Garrod 1904 “Concerning pads upon the finger joints and their clinical relationships”

• Described painless “pads or nodules” on the dorsum of the PIP joints
• 6 of 12 patients with these pads had DD hence he suggested that their presence might be followed by DD
Definitions

Webster’s New World Dictionary

- **Pad**
  - “anything soft used to protect from friction and blows; the cushion … of an animal’s paw”

- **Nodule**
  - “small knot or rounded lump”

Dorsal Dupuytren Nodule (Garrod node):

- Subcutaneous, firm, well-defined, tumor-like mass 3mm in diameter or greater and located over the dorsum of the PIP joint
Definitions

• Histologically DDN is similar to palmar nodule

Definitions

Dorsal Cutaneous Pads (Knuckle pads):
• Painless thickening, sclerosis and loss of skin elasticity and creases over the PIP or MCP joints
Knuckle Pads Versus Dorsal Nodules

Diagnostic study
“Dorsal Pads Versus Nodules in Normal Population and Dupuytren’s Disease Patients”

• 50 consecutive study patients with DD
• 50 control patients without DD
• Were assessed for
• Dorsal:
  – Cutaneous pads
  – Dupuytren’s nodules
Dorsal Cutaneous Pads

- Control Group = 9 (18%)
- DD Group = 11 patients (22%)

Dorsal Dupuytren Nodules

- Control Group = 0
- DD Group = 9 patients (18%)
Dorsal Cutaneous Pads

- Often over the PIP sometimes MP joints
- Tendency to occur among males
- Physically demanding occupations
- Dominant hand
- Index and middle fingers were most frequently affected

Dorsal Dupuytren Nodules

- Primarily in Caucasian males
- No predilection to physically demanding jobs
- Predominantly over the PIP joints
- Average size of 6 mm
Knuckle Pads Versus Dorsal Nodules

- Dorsal cutaneous pads have similar prevalence in normal population and DD patients
- Dorsal Dupuytren nodules are pathognomonic of DD and common among patients with strong diathesis
- Future studies on DD should make a clear distinction between these two clinical entities.

Conclusion

- DD can occur without associated conditions
- Associated conditions alter the course of DD
- DD should be differentiated from Non-DD
- Dorsal cutaneous pads must be differentiated from dorsal Dupuytren's nodules
Thank You
• Is there Juvenile DD?
• There is Juvenile fibromatosis
• Anderson 1891 1st used term diathesis
• Hueston 1st to use term ectopic disease
• Needle or knife?
DD in Women

- Results of surgery are disappointing
- “Frozen hand” may develop

  - Wallace 1965

DD Surgery

“Flare reaction”
- Occurs 3\textsuperscript{rd} – 4\textsuperscript{th} week postoperatively
- 5 – 10 %
- Redness
- Edema
- Pain
- Stiffness

  - Howard 1959
DD Surgery

“Flare reaction”
• 12% in men
• 24% in women
• 46% after extensive fasciectomy
• 58% simultaneously with CTR

• Zemel et al 1988
Dupuytren’s Disease Symposium

Epidemiology and Outcome Tools in Dupuytren’s Disease
Barry Simmons, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Identify the development of outcome instruments.

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Dupuytren’s Disease

Epidemiology

Outcome Tools and Outcomes of Treatment
B. Simmons
59 year old white male comes from Normandy positive family history ectopic foci smoker no tuberculosis no epilepsy average intake of wine has had 17 operations on his hands

Dupuytren’s Disease

What is the etiology? Is there a diathesis? Who has Dupuytren’s diathesis?
DUPUYTREN’S DISEASE

Who is Dupuytren?
Complete Biography to follow!
Why is it called Dupuytren’s Disease?

Baron Guillaume Dupuytren
Lancet 2: 222; 1834

“Retraction of the fingers, Gentlemen, and particularly of the ring finger, has been observed for many years, but it was only very lately that the cause of this deformity has been investigated with success.”
Baron Guillaume Dupuytren
Lancet 2: 222; 1834

• “If we consider the multitude of reasons assigned as a cause of this disease, the quantities of remedies proposed for its cure, and the various hypotheses put forth on its origin, it is not surprising that that many surgeons have regarded it as incurable. “

Baron Guillaume Dupuytren
Lancet 2: 222; 1834

• Etiology
  – Rheumatismal affection
  – Gout
  – External violence
  – Fracture
  – Metastasis of morbic cause
  – Inflammation
Epidemiology
Dupuytren’s Risk Factors

- Positive family history
- Male
- Alcoholism
- AGE OF ONSET
- Epilepsy (not treatment for epilepsy)
- Northern European origin
- Caucasian

Epidemiology
Dupuytren’s Diathesis

- Cirrhosis
- Insulin-dependent diabetes
- Smoking
- High recurrence rate after surgery (up to 80%)
Dupuytren’s Diathesis

- Bilateral involvement
- Multiple digit involvement
- First web space disease
- Multiple ectopic foci
  - Knuckle pads (Garrod’s nodes)
  - Arch of feet
  - Penis

50 years experience with Dupuytren's contracture in the Erlangen University Hospital--a retrospective analysis of 2919 operated hands from 1956 to 2006.

- BMC Musculoskelet Disord. 2007 Jul 4;8:60
- We could not confirm a statistically significant correlation of DD with diabetes mellitus, severe alcohol consumption, heavy smoking or epilepsy and the stage of the disease as described in other studies. However, in the whole cohort of our operated patients during the last 50 years the prevalence of the above mentioned risk factors is slightly higher than in the normal population.
Epidemiological Evaluation of Dupuytren's Disease Incidence and Prevalence Rates in Relation to Etiology.

- A total of 620 articles were cited. Forty-nine studies were subsequently identified as relevant.
- The majority of the prevalence studies have been conducted in Scandinavia or the UK, and the vast changes in population structure, the changes in prevalence of associated diseases, and the change in diagnostic criteria of DD makes understanding the epidemiology of this condition difficult.

Dupuytren contracture in North Germany. Epidemiological study of 500 cases

- Unfallchirurg. 2001 Apr;104(4):303-11
- 91.2% were of pure northern German stock
- 12.5% had a family predisposition
- male-to-female ratio was 7:1
- Men were afflicted on average at the age of 56 years
Dupuytren contracture in North Germany. Epidemiological study of 500 cases

- Ipsilateral lesions in 15% of cases
- 55.1% had bilateral contracture
- Ectopic penile and plantar fibrosis or knuckle pads were found in 6.7% of cases
- Drinkers and smokers presented significantly more severe contractures
- 8.2% of diabetics displayed a milder form

Dupuytren contracture in North Germany. Epidemiological study of 500 cases

- Women develop the disease one decade later than men
- In old age the male-to-female ratio equalizes
- Drinkers, smokers and heavy manual workers present a more severe affliction
- Diabetics suffer from a significantly more severe form
- Dupuytren's disease is not recognized as an occupational disease
Dupuytren's disease risk factors

- quantify the relative contributions of diabetes and epilepsy as risk factors for Dupuytren's disease
- 821 cases and 1,642 controls
- 72% of the cases were men
- mean age at diagnosis was 62
- Diabetes was a significant risk factor
- Epilepsy and anti-epileptic medications were not associated with Dupuytren's disease

Dupuytren's disease in diabetes mellitus

- Acta Diabetol Lat. 1977 May-Aug;14(3-4):170
- Dupuytren's disease (DD) was demonstrated in 169 of 959 diabetics (17.6%)
- 9 of 1,396 non-diabetic patients (0.64%)
- One hundred and seventy-nine of the 185 patients with DD had overt or latent diabetes mellitus (96.7%).
- DD should be regarded as a non-hyperglycemic manifestation of diabetes mellitus and its presence in a patient should prompt the investigation of glucose metabolism.
Epilepsy and Dupuytren's contracture

- Dupuytren's contracture was observed in 21.6 percent of 524 patients with epilepsy
- no correlation has been found between Dupuytren's contracture and liver disease

Dupuytren's disease, alcohol consumption and alcoholism

- The Health Care Centre, Blönduós, Iceland
- OUTCOME MEASURES: Alcoholism, alcohol consumption and signs of Dupuytren's disease.
- RESULTS: Our findings do not support a positive association between the use of alcohol and Dupuytren's disease
The association between alcohol, hepatic pathology and Dupuytren's disease

- J Hand Surg Br. 1992 Feb;17(1):71-4
- We conclude that alcoholics probably do have a higher rate of Dupuytren's disease and that this effect is largely due to the liver disease caused by alcohol abuse, but that the genetic factors are of greater aetiological importance.

Gender ratio of Dupuytren's disease in the modern U.S. population.

- The male-to-female ratio for patients younger than 54 years of age was 4.0:1
- The ratio approached 1:1 with increasing age
Dupuytren's palmar contracture in women

- average age at presentation was 60.1 years
- A few of the patients originated from Asia and Africa
- slightly higher incidence of proximal interphalangeal joint contracture in female patients
- females expressed less severe contractures on presentation and a slower progression thereafter
- favorable functional postoperative outcome was observed

Results of surgical treatment of Dupuytren's disease in women: a review of 109 consecutive patients

- *J Hand Surg Am.* 2007 Nov;32(9):1423-8
- 109 women were identified, 119 operative hands
- Comparisons were made with 548 men
- average age at presentation was 63 years in women
- Dupuytren's disease is less prevalent in women but its symptomatic presentation is similar to that in men
Results of surgical treatment of Dupuytren's disease in women: a review of 109 consecutive patients

- more severe involvement of the PIP joint in women
- similar recurrence rate compared to men
- The surgical outcomes, however, were equivalent with regard to final contracture correction, recurrence, and complication rates.

Dupuytren's contracture in the black population: a review

- a review of the world literature dealing with the black population and Dupuytren's disease
- total of 23 patients
- no Caucasian admixture and negative family history of Dupuytren's
- diathesis or predisposition for Dupuytren's contracture appears to be less extensive
Baron Guillaume Dupuytren
Lancet 2: 222; 1834

- Etiology
  - Rheumatismal affection
  - Gout
  - External violence
  - Fracture
  - Metastasis of morbic cause
  - Inflammation

### Epidemiology

**Dupuytren’s Risk Factors**

- Positive family history: YES
- Male AND FEMALE (there are no other choices)
- Alcoholism: YES
- AGE OF ONSET: NOT STUDIED (YES)
- Epilepsy (not treatment for epilepsy): NO
- Northern European origin: EVERYONE IS A “MUTT”
- Caucasian (BUT ALSO DOCUMENTED IN BLACKS)
Epidemiology
Dupuytren’s Diathesis

• Cirrhosis: NO
• Insulin-dependent diabetes: YES
• Smoking: YES
• High recurrence rate after surgery (up to 80%): NOT CITED HERE

Dupuytren’s Diathesis

• Bilateral involvement: YES
• Multiple digit involvement: YES
• First web space disease: MAYBE
• Multiple ectopic foci: YES
  – Knuckle pads (Garrod’s nodes)
  – Arch of feet
  – Penis
Outcomes/Results

PubMed Search on Dupuytren’s Disease

2060 articles reviewed
No Prospective studies examining outcomes as measured by patient satisfaction or recurrence
Outcomes Research

• Outcomes Research, measured by Outcomes instruments, should not be confused with the conventional “Outcomes” or “Results” of treatment
• Both are extremely valuable and measure different areas of “outcomes” of disease treatment
• Patient satisfaction is an important part of results previously not adequately measured

Codman

• Father of Outcomes research
• Demanded greater analysis of treatments
• Earned him rancor and dismissal from hospital staff
OUTCOME RESEARCH

• patient-based research not process-based research

EVIDENCE-BASED MEDICINE

will this be government mandated?
“The U.S. has no native criminal class except the Congress.”

• Mark Twain

Outcome Research Methodologies: Retrospective Studies

• Medicare Statistical Files System
• Small Area Variation Analysis
• Claims Data Systems
• Meta-Analysis
Outcome Instruments

• Multiple:
  – SF 36 (short form 36) or SF 12
    • Measures general overall health
  – Arthritis Impact Measurements (AIMS)
  – Functional Status Index (FSI)
  – Sickness Impact Profile (SIPS)
  – WOMAC

Outcome Instruments

• Too costly to develop multiple disease-specific instruments
• AAOS goal was to develop more generic instruments
  – Upper extremity (DASH)
  – Lower Extremity
  – Spine
  – Pediatric
Disabilities Arm Shoulder and Hand (DASH)

- 30-item, self-report questionnaire
- measures physical function and symptoms in people with any of several musculoskeletal disorders of the upper limb
- valid, reliable, internally consistent and responsive to clinical change
- Property of the Institute for Work & Health
- Jointly developed by AAOS, AASH, AOSSM, ASES, ASSH, AANA, ASPRS
- Available on-line from IWH

Outcome Tools

- No disease-specific tools for the treatment of Dupuytren’s disease
- Example of a disease-specific instrument: Brigham/Boston Carpal Tunnel Questionnaire
A Self-Administered Questionnaire for the Assessment of Severity of Symptoms and Functional Status in Carpal Tunnel Syndrome

- Levine, DL, Simmons, BS, et al
- JBJS 75A, 1585: 1993
- Symptom Severity: 11 questions
- Functional Status: 8 questions

Development of an Outcomes Questionnaire

- Reproducible
  - Similar results on successive tests
- Internally Consistent
  - reflects the ability of the scale to measure a single coherent concept
- Validity
  - whether the instrument actually measures what it is purported to measure
- Sensitive to Clinical Change
  - instrument's ability to detect changes in clinical status
Symptom Severity Scale

• 11 questions:
  – How severe is pain you have at night
  – How often does it awaken you
  – Do you have pain in the daytime
  – How often do you have daytime pain
  – How long does the pain last
  – Do you have numbness

Symptom Severity Scale

• 11 questions:
  – Do you have weakness
  – Do you have tingling
  – How severe is the numbness or tingling
  – How often does the numbness awaken you
  – Do you have difficulty grasping small objects

• Likert scale: 1-5, 5 worst
**Functional Status Scale**

- On a typical day in the past 2 weeks have you had difficulty with the following functions:
  - Writing
  - Buttoning
  - Holding a book
  - Holding a telephone
  - Opening a jar
  - Household chores
  - Carrying groceries
  - Bathing or dressing
- Likert scale: 1-5, 5 worst

**Symptoms, Functional Status and Neuromuscular Impairment Following Carpal Tunnel Release**

- Katz, JN, Fossel, KK, Simmons, BP, et al
- J. Hand Surg. 1995; 20 (A), 549
OUTCOME ASSESSMENT IN CARPAL TUNNEL SYNDROME:

• two year follow-up with standardized questionnaire and objective evaluation

OUTCOME ASSESSMENT

• median age 57 (range 19 – 88)
• male 23% : female 77%
• mean follow-up period 27 mos (range 16–33)
PARAMETERS INVESTIGATED

- grip strength
- pinch strength
- moving 2 point discrimination
- Semmes-Weinstein:
  - rest
  - after 1 minute wrist flexion
- Tinel’s sign
- incisional tenderness
- pillar tenderness

OUTCOME ASSESSMENT

- 2 year follow-up
- 48 patients available
  - 13 treated non-operatively
  - 35 treated operatively
- 26 available for physical exam
  - 4 treated non-operatively
  - 22 treated operatively
- independent examiner
## OUTCOME QUESTIONNAIRE Operative Group

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Functional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>3.1</td>
</tr>
<tr>
<td>Postoperative</td>
<td>1.9</td>
</tr>
</tbody>
</table>

## OUTCOME QUESTIONNAIRE Non-operative Group

- Symptom severity score: $2.4 \pm 1.0$
- Functional status score: $2.3 \pm 0.9$
PATIENT SATISFACTION

• greater satisfaction associated with greater improvement in the scores for both severity of symptoms and functional status

Correlations with Neuromuscular Impairment

• Moderate correlations with grip/pinch strength and weak correlations with two-point discrimination, Semmes-Weinstein and sensory conduction velocity
The effect of the severity of the Dupuytren's contracture on the function of the hand before and after surgery

- investigated the effect on the power and function of the hand of loss of finger(s) extension, number of fingers involved and the patient's age
- the influence of improvement of finger extension and the patient's age on these variables after surgery

The effect of the severity of the Dupuytren's contracture on the function of the hand before and after surgery

- Presentation
  - total loss of extension 80 degrees
  - total grip strength 41 kg
  - DASH score 54
- Twelve months postop
  - total loss of extension decreased to 10 degrees
  - DASH score to 32 (both significant improvements)
  - Grip strength decreased slightly to 40 kg
The effect of the severity of the Dupuytren's contracture on the function of the hand before and after surgery

- severity of the contracture had no significant effect on function but had a significant negative effect on power
- number of fingers involved affected neither function nor power
- age of the patient did not influence function of the hand
- improvement of finger extension following surgery had significant beneficial effect on function, but no effect on power

The association between intraoperative correction of Dupuytren's disease and residual postoperative contracture

- The extent of the preoperative deformity was a significant predictor of complete intraoperative correction
- The extent of both preoperative deformity and intraoperative correction were significant predictors of loss of surgical correction after operation at months post-op.
Effect of severity of Dupuytren contracture on disability

- AMA guidelines were used to assess the impairment
- DASH questionnaire for evaluating disability
- no significant correlation between the DASH disability and the AMA impairment rating

Now Go Out There and Do an Outcome Study on the results of Treatment

- Thank You
Does a 'firebreak' full-thickness skin graft prevent recurrence after surgery for Dupuytren's contracture?: a prospective, randomised trial

- We did not identify any improvement in correction or recurrence of contracture after firebreak dermofasciectomy up to three years after surgery

Importance of skin graft in preventing recurrence of Dupuytren's contracture

- Chir Main. 2009 Dec;28(6):349-51
- Skin grafting was able to prevent further recurrence of recurrent Dupuytren's contracture in 20 out of 23 hands with more than 8 years of follow-up
- Only two patients presented with a complete diathesis of Dupuytren's contracture
- Since recurrence is still difficult to predict, primary skin grafting remains controversial
- Indications for the procedure are more definite once recurrence has occurred
Organization of Collagen in Dupuytren’s Disease

- Glimcher, MJ
  - Abnormal collagen involved and non-involved palmar fascia
  - Increased collagen content
  - Increase in hydroxylysine/hydroxylysinonorleucine content
  - Increased type III collagen (up to 25% vs minimums in type I collagen)
  - Myofibroblasts (specialized fibroblasts and not cells similar to smooth muscle fibers)

Baron Guillaume Dupuytren
1777-1835

- General Surgeon in Paris
- Somewhat controversial
- Palmar contractures felt to be tendinous
- Astley Cooper, MD, surgeon in London, described true cause in 1830; no treatment recommended
- Baron Boyer, MD, 1832: crispatura tendinum
Lancet 2: 222; 1834

- Clinical Lectures on Surgery delivered by Baron Dupuytren, Hotel Dieu, Paris (now city hall)
- Editor’s comment: “It is strange that the chief of the Hotel Dieu should be so little acquainted with his brother in surgery, as he is wont to call Astley Cooper.” (Do you think there’s a little competition between the English and the French?)

PATIENT SATISFACTION

- indicator of responsiveness
- indicator of validity
- measured by improvement in symptoms
- measured by improvement in functional status
Patient Satisfaction in Maine Medical Assessment Study

• 2 year follow-up
  – 91-97% patient satisfaction
  – 95% had relief of symptoms
Dupuytren’s Disease Symposium

Normal Palmer Fascial Anatomy
Vincent Hentz, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Describe how normal anatomy determines presentation of Dupuytren’s Disease.
• Discuss why patterns of disease develop as they do.

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Among the planners and speaker for this educational presentation only Dr. Hentz has disclosed the following relationship with a commercial supporter or relationships with a commercial entity whose products or services relate to the content of the educational presentation. An appropriate mechanism has been implemented to resolve all conflicts of interest prior to the presentation.

Scientific Advisory Board: Auxilium Pharmaceuticals
The Normal Fascia of the Hand and Digits

Vincent R. Hentz, MD
Professor of Surgery
RA Chase Center for Hand and Upper Limb Surgery
Stanford University. Stanford California

Palmar fascia

The palmar fascia consists of resistant, fibrous tissue arranged in longitudinal, transverse, oblique, and vertical fibers.
**Longitudinal Fibers**

Originate from the palmaris longus when it is present (teleologically different)

Fan from this origin, concentrating in flat bundles to each of the digits (pretendinous bands).

Distal termination remains controversial.

---

**Detailed anatomy of the longitudinal fibers**

Microdissections (Mc GROUTHER (1982)) demonstrate three types of distal insertions:

- Superficial fibers insert into the deep surface of the dermis around the distal palmar crease (skin pits of DD)
- Intermediate fibers continue to finger, contribute to the retrovascular fascial structures.
- Deep fibers bifurcate around the flexor tendon sheath, and insert on each side of the MP joint.
**Longitudinal fibers to the border digits**

**Thumb**
- Fibers pass toward the palmar surface of the thumb, generally less numerous, sometimes difficult to identify.
- Thumb fibers blend into the deep fascia overlying the thenar muscles.

**Fifth Finger**
- The ulnar extreme palmar fascia blends with the hypothenar fascia.

---

**Transverse fibers of the palmar fascia**

Concentrated in the mid-palm and the web spaces.

**Mid-palm transverse fibers**
- Lie deep to the longitudinal bundles (proximal transverse ligament of Tubiana) or (transverse palmar ligament of Skoog, 1967)
- Form a fibrous band approximately 1.5 cm wide
- Distal border at the level of the distal palmar skin crease
- Inseparable from the vertical fibers
Transverse fibers of the palmar fascia

Radial side of palm

- Proximal transverse fibers continue into the first web space, forming the proximal commissural ligament of the space.

Distal transverse fibers

- Cross the base of the proximal phalanges superficially (Schwimmband, BRAUNE (1873) now translated as “natatory ligament”).

- Proximal border well defined, extending from the radial border of the index finger to the ulnar border of the little finger.
Distal transverse fibers – border digits

At the base of the **little finger**, it divides to envelop the abductor digiti minimi muscle and the ulnar neurovascular bundle.

At the base of the **index finger**, it continues into the first web space where it becomes the distal comissural ligament of GRAPOW.

Distal transverse fibers

- Its distal edge extends into the digital fascia and the interdigital skin folds.
Vertical fibers of the palmar fascia

**Superficial vertical fibers**

- lie superficial to the triangular membrane of longitudinal and transverse fibers,
- consist of the abundant vertical fibers to the palm skin dermis (McGrouther, 1986).

**Deep vertical fibers**

- Deep to the palmar fascia, the vertical fibers coalesce into septae, or the "perforating fibers of Legueu and Juvara",

Vertical fibers of the palmar fascia

Deep vertical fibers

- Form 7-8 compartments for flexor tendons to each digit and separate compartments for the neurovascular bundles together with the lumbrical muscles, extend proximally to about the mid-palm.

Verticle Fibers of the palmar fascia

The major septum between the index flexor tendons and the neurovascular and lumbral space to the third interspace attaches to the third metacarpal, dividing the thenar or adductor space from the midpalmar space.
Fascial structures of the 1st web: longitudinal and transverse fibers

A - fascial skeleton of the thenar eminence

B – longitudinal fibers of the palmar fascia

- Some fibers insert distally into the dermis and on each side of the thumb MP joint (as in fingers)
- Other fibers insert into the intermuscular septum between the adductor pollicis and first dorsal interosseous muscles
- Others insert on the flexor tendon sheath of the index finger


Fascial structures of the thumb

Transverse fascia of the first web space

C – distal commissural ligament (Grapow, 1887) analogous to natatory ligament

D – proximal commissural ligament - similar to the proximal transverse fibers of the palmar fascia

Transverse fascia of the first web space

Two transverse structures cross the web space

- the distal commissural ligament described by GRAPOW in 1887 which is analogous to the natatory ligament of the other web spaces
- the proximal commissural ligament, similar to the proximal transverse fibers of the palmar fascia

The digital – palmar junction

Complex arrangement of fascial fibers

From McGrouther
The digital – palmar junction

The intermediate and deep fibers of the longitudinal bands:
- bifurcate on each side of the MP joints
- become posterior (dorsal) to the neurovascular bundles,
- some contributing to the origin of the digital retrovascular bands

The natatory ligament sends more superficial distal fibers to each finger (GOSSET, 1972).

The digital – palmar junction and the fascia of the 5th finger

From Barton
Digital Fascia

frequent anatomic variations

circular fascial covering

- volar sheet superficial to flexor tendon sheath
- dorsal sheet superficial to the extensor apparatus
- unite along the radial and ulnar sides of the finger, form an elliptical sheath around each neurovascular bundle.

Eponymous skin ligaments separate palmar and dorsal digital spaces

Cleland’s ligaments
Grayson’s ligaments
Landsmeer’s transverse retinacular ligament
Cleland’s ligaments

fibers arising from each side of each interphalangeal joint pass dorsal to the neurovascular bundles fanning out towards the lateral skin. do not form a continuous septum

THOMINE described a retrovascular band with several attachments to the lateral aspect of the bones and joints.

Reproduction of the original illustration of Grayson showing the lateral structures of the fingers:

Left side: Grayson’s ligament passing volar to the neuro-vascular bundle

Right side: Cleland’s ligament passing dorsal to the neuro-vascular bundle

From Milford L. “Retaining ligaments of the digits of the hand”. Saunders, Philadelphia 1968
Grayson’s Ligaments

From Milford L. "Retaining ligaments of the digits of the hand". Saunders, Philadelphia 1968

Landsmeer’s transverse retinacular ligament

- originate from the volar capsule of the PIP joint
- pass superficial to the two bundles of Cleland’s ligaments originating at the same level,
- take a dorsal course to attach to the lateral margin of the extensor mechanism.
Landsmeer’s oblique retinacular ligament

- originate from the flexor sheath near the PIP joint
- attach to the lateral band of the extensor mechanism
- Variably present

Normal anatomy of the fascias of the palm and digit – why bother?

Knowledge of the normal palmar fascial anatomy is the key to successful surgery for Dupuytren’s contracture
Dupuytren’s Disease Symposium

Pathoanatomy in Dupuytren’s Disease
Duncan A. McGrouther, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Recognize the individual longitudinal and transverse ligamentous structures in the palm and digit.
- Insert a needle for fasciotomy or injection into the longitudinal cords of the palmar fascia.

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Dupuytren’s Disease
Pathoanatomy

Robert McFarlane 1974

- Described the individual components of the palmar fascia
- Showed that the pattern of Dupuytren’s Disease was not random but followed anatomical structures
Longitudinal fibres of palmar fascia

Longitudinal fibres
Layer 1
Insertion into skin
Longitudinal fibres have 3 distal insertions

Layer 1
Clinical signs of involvement of layer 1 of longitudinal fibres

Nodule distal to distal palmar crease

Longitudinal fibres layer 1 - distal extension – Central cord

Central cord with skin involvement
Layer 1 - Skin pits due to contraction of vertical fibres

Skin Pits lie on top of longitudinal fibres

Involvement of layer 2 gives rise to a spiral cord which can displace the neurovascular bundle

-Spiral Cord
Involvement of layer 3 can flex the mp joint.
Transverse fibres are not involved

Intermetacarpal ligaments

Transverse fibres of palmar aponeurosis

Natatory Ligament
(Distal commissural ligament)

Proximal commissural ligament
Grayson’s ligaments

Grayson’s ligaments
Transverse ligaments in front of the neurovascular bundles

Cleland’s ligaments behind the neurovascular bundles
Cleland’s ligaments

Lateral digital sheet
Pip joint
Why is the pip joint so vulnerable?

1. **Mechanical factors**
   - Cascade posture - most flexed
   - Strong flexor, weak extensor
     - Flexor muscle bigger
     - Flexor bending moment greater
   - Dynamics of collateral ligament mysterious-folding

2. **Biological factors**
   - Inflammation -
     - Oedema flexes digit
   - Adhesions between multiple gliding planes
     - collateral ligament
     - accessory collateral ligament
Why is the pip joint so vulnerable?

2. Biological factors- chronic
   - Adhesions become fibrous
     - Extensor apparatus stuck
     - Intrinsic tendons stuck
   - Scar tissue shortens
     - Check rein ligaments contracted
Anatomy—what the surgeon needs to know

Dupuytren’s Disease does not have a random distribution
- The lesions (nodules, cords, knuckle pads) have defined positions
- Contracture follows anatomical pathways
- Passing from one fascial structure to another
- Contracture is longitudinal, not transverse
- Contracture displaces neurovascular bundles
Anatomy—what the surgeon needs to know

‘Predictable’ areas for the digital nerve
➢ Proximal to the distal palmar crease
➢ Distal to the pip joint

No Man’s Land in between?
Clinical Assessment in Dupuytren’s Disease
Alan Gotesman, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Describe the concept of a dynamic contracture in Dupuytren’s Disease.

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Dr. Alan Gotesman, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
Clinical Assessment in Dupuytren’s Disease

Alan Gotesman M.D.
Hand Fellow
Stony Brook University Medical Center

Background

- Dupuytren's is a characterized by the development of nodules and cords
- Nodule can be an evolutionary lesion that later matures to form a cord
- The cords are the cause of the digital contractures
Risk Factors

- Northern European
- Family history
- Male
- Alcohol
- Smoking
- Seizure disorder
- Diabetes
- Trauma

Ectopic Disease

- Knuckle pads
- Lederhose disease (plantar fibromatosis)
- Peyronie disease (penile fibromatosis)
Dupuytren’s diathesis

More aggressive forms when:
- Early onset of disease
- Ectopic disease
- Severe bilateral involvement

Clinical Presentation
- Usually bilateral
- One hand more involved
- Contracture starts in the palm
- Progresses distally
- Ring/little finger most common
Early Stages

Skin changes
- Pitting
- Dimpling
- Contraction of the longitudinal fibers

Palpable nodules
- Elevated
- Firm soft-tissue masses
- Fixed to the skin and palmar fascia.

Nodule
Later Stages

- Cords thicken
- Blends in with the nodule
- Adherent to the skin
- As cord matures, it becomes more prominent
- Takes on the rigid appearance of a “pseudotendon”
- Flexion contractures develop

Physical Examination

- Inspection and palpation of nodules and cords
- Careful measurements of involved joints using goniometer
- Table top test
- Neurovascular exam
Why Measure?

- Surgical Intervention
  - MP contracture of 30° or more
  - Any PIP contracture
- Accurate assessment of progression

Joint Measurements

- Same person should assess and record all joint measurements
- Goniometer should always be used
- Limit potential errors and provide consistency.
Joint Measurements

- Measurement for all MP and PIP joints in each hand
- Record to the closest 5° increment.
- The fixed flexion contracture is documented by recording the passive joint contracture.
- Done by passively extending the finger against the fixed flexion contracture
- Record the degrees of flexion at this point (static).

Contracture Measurement
Joint Measurement

Measurement Errors in Dupuytren’s Patients:

Keep the hinge of Goniometer as close as possible to axis of motion of the joint.
The arms of the goniometer should be flat against the skin so they are parallel to the longitudinal axis of the bone.

Measurement Errors

The hinge of Goniometer is over the proximal phalanx instead of the axis of motion of the MP joint.

Correct location for Goniometer hinge over the MP joint axis of motion.
Measurement Errors

The long arm of the Goniometer is off the metacarpal and the FC measurement is reading smaller than it actually is because the wrist is in dorsiflexion.

Correct wrist & Goniometer positioning while measuring MP joint flexion. Wrist in neutral and Goniometer flat against the metacarpal shaft.

Static vs. Dynamic

• Position of nearby joints effects the degree of contracture
Dynamic Contractures

- A single Central Cord can cross the MP and PIP joints
- May cause contractures of both joints.
- Usually both contractures are fixed
- Contractures may be dynamic
  - The position of one joint affects the recordable contracture in the other joint.
Dynamic Contractures

• MP and PIP joints held in maximum extension
• Central cord producing contractures of both

Dynamic Contractures

• PIP joint now placed in maximum flexion
• Central cord “relaxes”
Dynamic Contractures

- MP can be extended further with PIP flexed
- Laxity in cord taken up

Dynamic Contractures

- Same concept can be applied to PIP contracture
- If MP joint is flexed, PIP contracture may decrease by relaxing cord
Dynamic Contracture

Investigational Study

- Patients with a diagnosis of Dupuytren’s contracture
- Evaluated for contractures of the MCP and PIP joints in both hands excluding the thumb
- Goniometer used to measure the degree of contracture
- Both MCP and PIP held in maximum flexion and maximum extension while measuring
Measurements

MP Contracture

1 - PIP in max extension
2 - PIP in max flexion

PIP Contracture

3 - MP in max extension
4 - MP in max flexion

Study Population

- Nineteen patients
- Thirty-nine contracted digits
- Fifteen patients were male and four female.
- The average contracture was 47.6 degrees.
Results

- Fifteen fingers (38%) were noted to have a dynamic contracture
- More common in PIP (73%)
- The average difference was 17.7 degrees.

Conclusion

- Dynamic contractures can occur when measuring contractures in dupuytrens disease.
- Joint positions play an important role during the evaluation process.
- It is important to keep this in mind when evaluating patients for surgical intervention and progression of disease.
General Principles for Treating Dupuytren’s Disease
Stephen Coleman, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Identify factors influencing severity and nature of Dupuytren’s.
- Explain indications for considering treatment options, and likely outcomes.

Disclosure Statement

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Dr. Stephen Coleman, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
General Principles for Treating Dupuytren’s Disease

• Stephen Coleman
  – Brisbane Hand & Upper Limb Clinic
  – Brisbane, Australia
  – No disclosures

Principles

• Cannot change patient genetics
• Cannot change dynamics (diathesis)
• Cannot “cure”
• Not like a tumour!
• *Complete* cure not needed
Principles - Aims

- Reduce disability
- Do not make worse
- Do no harm (nerves, tendons, skin, joints)
- Change tissue mechanics (less skin tension)
- Slow disease progress
- Be well trained!

Indications for Treatment

- Reduced function – disability
  - Shaking hands
  - Pockets, handbag
  - Work tools
  - Sport
  - Hygiene
    - Web, pits
Indications for Treatment

• Rapid rate of progression
• Rapid decrease of function
• Women and radial slower
• May be very slow – years
• Review every 3 – 6 months
• Nodules may not progress
• Pain in early stage resolves

Conservative Treatment

• If :-
  – Minimal symptoms / disability
  – Minimal change with reviews
  – Medical contraindications
Principles for Intervention

• Best to treat before joint FFD
• Likely to need joint release if not
• Complicates treatment
• Lesser outcome
• More likely for deformity to recur

Fixed Flexion Deformities

• Rare to get fixed deformity MP joint
• Common to get fixed deformity PIP joint
• Avoid > 40° flexion at PIP
• Because of collateral ligament anatomy
Fixed Flexion Deformities

• MP collaterals lax in extension
• MP collaterals tight in flexion
• Allows one to grasp, then grip an object

Fixed Flexion Deformities - MP joint

• Related to ligament attachments
• MP ligament attachments eccentric
• $AX < AY$
• Ligament long in flexion, can always extend
• No urgency with MP flexion deformity
Fixed Flexion Deformities - PIP joint

- Collaterals more centrally inserted
- Longest in extension, short in flexion
- With time and flexion, contract if fixed
- Flexed position = contract short
- Cannot extend to longer length
- Flexion PIP > 40° may get fixed
- Then Dupuytren’s + stiff joint

Surgical Principles

- Cooperative patient
- Realistic expectations
- Healthy, not anaesthetic risk
- Younger more aggressive, treat earlier
- Cords before nodules, unless large
- Diathesis more likely to recur
Diathesis

- Younger onset
- Rapid progression
- “Viking ancestry”
- Family history
- Multiple digits
- Plantar nodules
- Garrod’s pads
- Peyronie’s

Warnings Prior to Surgery

- Will get scars
- May recur
- Some pain
- Incomplete PIP correction
- May need splints
- Complications – skin, nerves, joints, tendons
Summary

• Do operate on:-
  – Reduced function
  – PIP > 40°
  – Web contracture (hygiene)
  – Rapid increase deformity

Summary

• ? Operate on :-
  – Diathesis
  – Younger
  – Female
  – Thumb
Summary

• Do not operate on :-
  – Pain only
  – No disability
  – Severe PIP flexion (90°)
  – Osteoarthritis PIP joint
  – Anaesthetic risk
  – Inexperienced surgeon

References

2. Hueston, J – The Table Top Test. The hand 1982; 14:100-103.
Dupuytren’s Disease Symposium

Open Fasciectomy
Roy Meals, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Discuss the planning, execution and after care of open treatment for Dupuytren’s contracture.
• Discuss the complications and their management associated with the open treatment of Dupuytren’s contracture.

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Among the planners and speaker for this educational presentation only Dr. Meals has disclosed the following relationship with a commercial supporter or relationships with a commercial entity whose products or services relate to the content of the educational presentation. An appropriate mechanism has been implemented to resolve all conflicts of interest prior to the presentation.

Auxilium Pharmaceuticals: Consultant, Principal Investigator
D.A. McGrouther: “As a general rule, patients and surgeons underestimate what is involved in recovery from Dupuytren’s surgery and may overestimate the benefits to be derived from surgery.”

Open Excision
Pros/Cons

• Advantage: directly visualize anatomy and pathology
  – Potential for thorough removal of affected and potentially affected tissues
• Disadvantage: considerable tissue dissection
  – requires regional/general anesthesia, post-op analgesics, big bandage, 4-8 week return to full activity
Open Excision Challenges

– Preserve skin, neurovascular bundles, tendon sheath, collateral ligaments
– Fasciectomy: partial vs. complete
– Skin closure/coverage
– Guide patient over post-op hurdles
  • Wound complications, pain, numbness, contracture, stiffness in untreated fingers

Open Excision Skin Management

• Indisputable truth: wounds contract as they heal
• Therefore arrange incisions to avoid post-op longitudinal (flexion) contracture
  – Transverse incisions
  – Oblique incisions
  – Longitudinal incision and convert to transverse/oblique incisions at closure
  – Skin graft
Open Excision
Skin Management

• Transverse incisions and (minimal) primary closure
  – Visualization and protection of nerves difficult
  – Minimally visible scars

Open Excision
Skin Management

• Transverse incision(s) and leave open
  – aka McCash technique
  – Myofibroblastic contraction

Day of surgery 2 weeks 9 weeks
Open Excision
Skin Management

• Oblique incisions
  – aka Bruner incision

Open Excision
Skin Management

• Longitudinal incision and convert to transverse/oblique incision at closure
• aka Z-plasty
  – Advantage: lengthens skin in longitudinal axis
  – Effectively solves longitudinal skin scar contracture
  – Adds time to surgery; diminishes vascularity to wound edges, thereby slows skin healing
Open Excision: Skin Management
Full Thickness Skin Graft
Open Excision
Skin Management

• Pattern of incisions dependent on
  – Specific pattern involvement in a specific hand
    • Contracted fascia
    • Skin adherence, pits, previous scars/grafts
  – Surgeon’s experience and preference

Open Excision
Removing the Contracted Tissue

• Identify and protect the neurovascular bundles
  – dissect proximal to distal and distal to proximal
• Remove retrovascular fascia at the PIP joint
• Transversely open flexor sheath if necessary
• Volar plate release occasionally necessary
• Check passive PIP extension w/ MP in flexion
  – pin PIP in extension if extensor lag exists
Pearls

- Avoid incisions in webs when possible
- Purple-ate the skin before elevating it
- Plan location of Zs after completing fasciectomy
- Close skin loosely
- Leave sutures 1” long

Open Excision Aftercare

- Day 0-7: Elevation, splint for comfort and early skin healing, use uninvolved digits for ADLs
- Day 8-14: Light, soft bandage: begin warm water soaks and home active/passive motion
- Day 14: sutures out
  - If motion is nearly full: continue home program
  - If motion is limited, especially if guarded, begin formal hand therapy
Recurrence: Published Rates Vary Widely

+- differentiate between recurrence and extension
+- differentiate between recurrence to pre-op state or just a mild change from full motion
Duration of follow-up
Is recurrent contracture from Dup, incompetent central slip, OA, skin scar, pulley excision?
Depends on who you ask and when you ask them
Perhaps less with dermatofasciectomy

Current Literature Review: Quiz

- Contractures in 196 patients
  - all with >20° at PIP, half with >30° at MP
- Wound Cx 15%, CRPS 10%, NVS Cx 5%
- What percent had full MP and PIP motion at last f/u (2-9 years)?

73%
Current Literature Review: Quiz


- 143 rays/103 patients
- Skin excision and FTSG
- Mean f/u ~6 years

- Rays with recurrence?

Current Literature Review: Quiz


- Randomized longitudinal incision with Z-plasty vs Bruner incision with Y->V advancement
- 2 year f/u
- Any difference on the outcome?
Current Literature Review: Quiz


- 90 fingers randomized to Z-plasty vs. firebreak FTSG
- 3 year f/u, 12% recurrence
- Any difference in results with respect to coverage technique? No

Current Literature Review: Quiz

Predicting the outcome of surgery for the PIP joint in Dupuytren’s. J Hand Surg 2007, 32:240

- 49 PIPs: 67° pre-op, 6° at surgery, 25° late f/u
- Which factor did not affect results?
  A. Severity of pre-op contracture
  B. Incomplete correction
  C. Poor compliance
  D. Digit involved
  E. Recurrent disease

- 61 patients, f/u 3.5 years
- Complications in 14%
- Recurrence in 11%
- Rate of nerve injury?


- 43 severely contracted PIP joints
- 11 with >20° contracture s/p fasciectomy had capsuloligamentous release
- Any difference at 6 months?

- 34 PIPs, mean 89° contracture
- 1st stage: palmar fasciotomy, PIP capsulotomy, PIP ex fix for 6 weeks
- 2nd stage 2 weeks later: fasciectomy, FTSG
- Residual contracture at 30 months?

Intramuscular tenotomy of FDS in the distal forearm after surgical excision of Dupuytren’s. J Hand Surg 2003, 28:37

- FDS contributes to PIP contracture
- 5 cases of intramuscular tenotomy in distal forearm
- Improved finger extension
- Any loss of strength?
Open Fasciectomy: Conclusion

Duncan McGrouther: “As a general rule, patients and surgeons underestimate what is involved in recovery from Dupuytren’s surgery and may overestimate the benefits to be derived from surgery.”
Dupuytren’s Disease Symposium

Segmental Fasciectomy
John Lubahn, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Identify the indications for aponeuectomy as opposed to other well accepted procedures.
- Discuss the technique for aponeurecomy.
- Prescribe post-operative care and management.
- Describe expected contracture recurrence rates.

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Use of Segmental Aponeurectomy

Hotel Dieu

**Methods**
- Retrospective cohort series
- 213 consecutive segmental aponeurectomies, 175 patients.
- Operative Technique:
  - several small curved skin incisions
  - segments of diseased tissue excised (about 1 cm)
  - No attempt to remove all diseased
  - aim to achieve discontinuity

**Results:** 12 Complications. 4 Hematomas, 2 Skin necrosis, 2 Digital nerves, 2 CRPS

- Full extension in 55.7% F/U 2.6 years
- Extension Contracture <45 degrees in 86.2%
- Late results: 84 procedures in 67 patients
- Disease extension: 12/84, recurrence in 18, recurrence and extension, 12
- No residual contracture in 38 patients (45.2%)


**Methods**
- Prospective cohort study
- Segmental aponeurectomy
- 46 patients (50 hands) with primary disease
- Series of C-shaped incisions, excision of small segments (approximately one centimetre) of diseased tissue

**Results**
- Similar correction of deformity to limited fasciectomy
- One wound complication
- No wound haematomas
- Two patients lost flexion and one digital nerve was damaged
- Recurrence at one year was no higher than with other techniques.

**Conclusion:** Segmental aponeurectomy is a valuable alternative operation for Dupuytren’s contracture, particularly in elderly patients.

**Background:** Segmental aponeurectomy has been proposed as a less extensive procedure for the treatment of Dupuytren's disease to limit the incidence of wound complications and stiffness associated with wide dissections.

**Methods:** 292 procedures in 240 patients, f/u at mean 2.9 years

**Results:**
- Lasting correction of the contracture (recurrence rate 38%)
- 59%(141) of the 292 procedures were available for evaluation.
- 45% (77) had no contracture at all
- 24 needed further surgery.
- Proportions of recurrences, extensions and hands free of the disease are similar to those after other procedures

**Conclusions:**
- Efficacious
- Type of operation does not appear to be related to the progression of Dupuytren's disease.


**Opinion/Review**
- Evolution in practice:
  - Regional or local anaesthesia
  - Outpatient
- Polarizing Issue: surgical intervention
  - minimal surgery (e.g. segmental fasciectomy) for early disease
  - aggressive surgery (dermofasciectomy) for advanced and recurrent disease.

**Methods**
- Retrospective cohort series, 80 aponeurectomies
- 1993 to 1999
- Well-localized palmar cords w/ MCP flexion contracture
- F/U: min 1 yr

**Results**
- Recurrence: 6%
- Two minor complications

**Conclusion:** Segmental aponeurectomy rather than limited fasciectomy is recommended for this type of disease.


**Methods**
- Cohort study, 38 patients,
  - isolated fifth ray involvement
  - PIP
- Three surgical techniques
  - limited fasciectomy
  - segmental fasciectomy
  - Dermofasciectomy
- Mean F/U: 53.6 mo

**Results**
- No residual deformities, recurrences @ MCP
- PIP: ROM improved 45°; residual flexion deformity averaged 30°
- Recurrence rate: 39%
- No Tx effect

**Conclusion:** Fifth ray involvement in Dupuytren's disease remains a surgical challenge, esp. @ PIP. Residual deformity, recurrence remain high, irrespective of intervention.
Dupuytren’s Disease Symposium

Dermatofasciectomy
Caroline LeClercq, M.D.

Educational Objectives
Upon completion, participants should be able to:

- Describe the technique of dermatofasciectomy, including tips, pitfalls and potential complications.
- Develop the correct understanding of the short and long term results that can be anticipated with this technique.
- Decide which are the proper indications of the technique for their own patients.

Disclosure Statement

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Dermo-fasciectomy

C. Leclercq, S. Gallego, N. Karray
Institut de la Main
Paris, France
Dermo-fasciectomy definition

Deliberate excision of the skin together with the underlying involved fascia, and subsequent grafting

* fire-break grafts
History

John Hueston

*Piulachs & Mir y Mir 1952
*Hueston 1962, 1969
  clinical observation: no recurrence under skin graft
  role of dermis in controlling sub-cutaneous tissues
*Gordon 1964
*Rudolph 1977, 1979
  inhibition of myofibroblasts under FT skin graft

Raoul Tubiana
**Indications litterature**

- Recurrent disease +++
  - Tonkin 1984
  - Brotherston 1994
  - Hall and Logan 1997...

- Strong diathesis
  - Tonkin 1984

- Significant skin involvement
  - Hall and Logan 1997
  - Armstrong & Logan 2000

- 5th finger, radial involvement
  - Abbe 2004

**Diathesis**

- Hueston (1963)
  - Ethnicity
  - Family history
  - Ectopic lesions
  - Bilateral involvement
  - Young age of onset
Diathesis revisited

Abe 2004

Hindocha & Stanley 2006
322 patients
-Ethnicity
-Family history: less significant
-Ectopic lesions: knuckle pads
-Bilateral involvement
-Young age of onset < 50 yo
-Male gender
-Alcohol consumption > 28 U/w

*1U = 10ml pure ethanol = 1 small glass of wine

Figure 1. Bar graph representing the mean predictive risk of developing argomentOQ based on the number of risk factors present from Table 3.

Hindocha & Stanley 2006
# Indications

<table>
<thead>
<tr>
<th>Indications for dermofasciectomy</th>
<th>Number of surgeons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redo surgery</td>
<td>84 (59.6%)</td>
</tr>
<tr>
<td>Cannot close the skin</td>
<td>40 (28.3%)</td>
</tr>
<tr>
<td>Young patient</td>
<td>29 (20.6%)</td>
</tr>
<tr>
<td>Would never perform this operation</td>
<td>19 (13.5%)</td>
</tr>
<tr>
<td>Always perform this operation</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>Skin involvement*</td>
<td>11 (7.8%)</td>
</tr>
<tr>
<td>Diathesis*</td>
<td>4 (2.8%)</td>
</tr>
</tbody>
</table>

All surgeons answered all parts of this question.

*Not offered as an option; surgeons volunteered this reason themselves.

Au-Yong (BSSH survey) 2005
Skin excision:
Digital or palmo-digital "functional skin units" (Michon)

Regional fasciectomy
- Primary treatment:
  Limited to involved tissues
  Extensive in the finger
  (pre/latero/retro-pedicle)

- Recurrence:
  Limited to tissues preventing extension
Technique

Tourniquet release
Thorough hemostasis

Technique

Skin graft
- Full thickness
- Medial arm (groin)
**Technique**

Tie-over dressing

**Post-operative regimen**

Remove tie-over at 1 wk  
Gentle self-mobilization  
Remove sutures and all dressing 2 wks
Post-operative regimen

Physiotherapy +/- splinting
2 weeks

Case 1
no

Case 2
yes

Institut de la Main
Personal series
Dermo-fasciectomy
Long term follow-up 2009

43 patients / 66 dermo-fasciectomies

Indications:
- Recurrence 44
- Strong diathesis 22

Male
32 y.o.
Manual worker
Family history of DD (father)
Bilateral involvement
Personal series
43 patients / 66 dermo-fasciectomies

Sex : 79% males
Age of onset : m=42 years
Bilateral disease : 63%
Ectopic lesions : 53%
Family history : 56%
Alcohol consumption : 35%

Institut de la Main

Personal series
43 patients / 66 dermo-fasciectomies

Nb fingers involved
1 finger 30%
2 fingers 35%
3 and + : 35%

Severity (Tubiana’s grading system)
Stade I : 12%
Stage II : 53%
Stage III : 33%
Stage IV : 2%
Personal series
43 patients / 66 dermo-fasciectomies

Little finger 66 %

Complications
- Nerve lesion 3 4.5%
- Arterial lesion 9 13.5%
  ulnar collateral Vth finger 8
  radial collateral index 1
- Hematoma 0
- Graft necrosis: complete 0, minimal 8
- CRPS 0
- PIPj lack of flexion 8 12%
- Amputation: 0
Personal series
43 patients / 66 dermo-fasciectomies

23 patients reviewed
-19 clinically
-4 telephone interviews + photographs and Xrays

Follow-up
5 y to 14 y
average 6.5 years

Female physician
36 y.o.
Family history
Knuckle pads + Ledderhose
7y post-op
Personal series
23 patients reviewed
34 hands / 41 dermofasciectomies

Recurrence*  9/41  21%
-under skin graft  0
-edge of skin graft  4
-outside grafted area  5

*Def: Reappearance of Dupuytren’s tissue
in an area previously cleared surgically

Personal series
23 patients reviewed
34 hands / 41 dermofasciectomies

Extension*  22/34  64%

*Def: Appearance of the disease in an area
previously unaffected
Personal series
23 patients reviewed
34 hands / 41 dermofasciectomies

Extension*  22/34  64%

*Def: Appearance of the disease in an area previously unaffected
### Graft complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
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<tbody>
<tr>
<td>Hyperpigmentation</td>
<td>13</td>
</tr>
<tr>
<td>Scar contracture (edge)</td>
<td>4</td>
</tr>
<tr>
<td>Hair</td>
<td>5</td>
</tr>
<tr>
<td>Hyperkeratosis</td>
<td>3</td>
</tr>
<tr>
<td>Hypesthesiae</td>
<td>1</td>
</tr>
<tr>
<td>Skin instability</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
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### Graft

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* No complain at donor site
Discussion

Technique

Arthrolysis

Flexor sheath opening
Compromises graft take

Graft necrosis over FDS
Cross finger flap
Discussion

Technique

Size of graft
- Digital
- Or palmo-digital

Palmar graft: instability ulceration

CI Manual worker
Discussion
Recurrence: 21% at 6.8 yrs
(Recurrence in Fasciectomies 40 to 62%)

Results

<table>
<thead>
<tr>
<th></th>
<th>Nb rays</th>
<th>Follow-up</th>
<th>Nb recur under graft</th>
<th>Nb recur outside graft</th>
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<tbody>
<tr>
<td>Gordon</td>
<td>1964</td>
<td>42</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tonkin</td>
<td>1984</td>
<td>41</td>
<td>3.2y</td>
<td>4%</td>
</tr>
<tr>
<td>Tubiana</td>
<td>1986</td>
<td>11</td>
<td>10y</td>
<td>0</td>
</tr>
<tr>
<td>Ketchum</td>
<td>1987</td>
<td>36</td>
<td>3.9y</td>
<td>0</td>
</tr>
<tr>
<td>Searle</td>
<td>1992</td>
<td>40</td>
<td>3.2y</td>
<td>0</td>
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<tr>
<td>Kelly</td>
<td>1992</td>
<td>32</td>
<td>11-17y</td>
<td>6%</td>
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<td>Brotherston</td>
<td>1994</td>
<td>34</td>
<td>8.4</td>
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<td>Armstrong</td>
<td>2000</td>
<td>143</td>
<td>5.8y</td>
<td>?</td>
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<tr>
<td>Present series</td>
<td>2009</td>
<td>41</td>
<td>6.8y</td>
<td>0</td>
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<td>3.2 y</td>
<td>0</td>
<td>10% margin</td>
</tr>
<tr>
<td>Kelly</td>
<td>1992</td>
<td>32</td>
<td>11-17y</td>
<td>0</td>
<td>47%</td>
</tr>
<tr>
<td>Brotherston</td>
<td>1994</td>
<td>34</td>
<td>8.4</td>
<td>0</td>
<td>?</td>
</tr>
<tr>
<td>Armstrong</td>
<td>2000</td>
<td>143</td>
<td>5.8 y</td>
<td>?</td>
<td>8%</td>
</tr>
<tr>
<td>Present series</td>
<td>2009</td>
<td>41</td>
<td>6.8 y</td>
<td>0</td>
<td>21%</td>
</tr>
</tbody>
</table>

Discussion

Extension: 64%

Extension in Fasciectomy 40 to 60%
Conclusion

• Technical difficulties
• Grafted skin in the hand: suboptimal
• No influence on the general evolution of the disease

BUT

• Local inhibition of DD's tissue growth
• Prevention of local recurrence
Conclusion

BUT

Local inhibition of DD's tissue growth
- Prevention of local recurrence
- Makes further surgery much easier

62 y.o. - 3 previous interventions
Retired Gentleman-farmer
RIGHT HAND
Dermo-Fasciectomy 3 & 4

LEFT HAND
Dermo-fasciectomy 4 & 5
then 2
Dupuytren’s Disease Symposium

PIP Joint in Dupuytren’s Disease
A. Lee Osterman, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Discuss the pathology of the PIPJ in Dupuytren’s.
• Appreciate why the PIPJ is so recalcitrant to treatment.
• Provide an algorithm for PIPJ treatment
• Outline the outcomes of such treatment.

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Auxilium Pharmaceuticals: Consultant
The Proximal Interphalangeal Joint in Dupuytren’s Disease

A Lee Osterman, MD

Conflicts

Paid consultant to Auxilium
Involved in some Clinical trials
PIPJ surgery in Dupuytren’s

Highly variable

A BAD ACTOR
1. The PIP joint.
2. Secondary fasciectomy. The PIP joint after secondary fasciectomy carries a worse prognosis than the PIP joint after primary fasciectomy.
3. The small finger. The small finger PIP joint carries a worse prognosis than the ring finger PIP joint.
4. The number of rays involved. The prognosis is worse if more than one ray is involved.
5. The length of time since operation. The longer the duration, the worse the prognosis.

No effect

Adam, 1992

The PIPJ is a major determinant of functional outcome

Sinha J Hand Surg 2002
Draviaraj J hand Surg 2004

Improvement in the PIPJ contracture has a greater correlation with hand function than an improvement in the MCPJ contracture
The Stiff PIPJ

Primary Contracture
Involvement of Dupuytren’s Fascial elements

Secondary Contracture
Adaptive Changes in Normal Structures

MCPJ contrature

Pretendinous Cord
Multiple cords

A. Central
B. Spiral
C. Lateral

The Diseased Fascia of PIPJ contracture
Multiple Patterns
A dissection of the Neurovascular bundles

Abductor Digiti Minimi Cord
Importance of the ADM cord

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCPJ</td>
<td>PIPJ</td>
</tr>
<tr>
<td>ADM</td>
<td>17°</td>
<td>53°</td>
</tr>
<tr>
<td>No ADM</td>
<td>34°</td>
<td>31°</td>
</tr>
</tbody>
</table>

All differences in joint contractures were statistically significant (p < .05).

Meathrel, J Hand Surg, 2004

Secondary Contracture

Volar Plate
Collateral Ligament
Flexor Sheath
Oblique retinacular
Flexor tendon
Skin
Extensor Tendon
Boney Block
Central slip attenuates
Oblique Retinacular Ligament
Volar plate+
Check reins shorten

Boney Changes
Arthritis
Central slip Attenuation

80% with contractures > 60°

Smith, J Hand Surg 1994

1. Release /Excise the Dups tissue
2. Release the secondary Constraints
What Remains Controversial

Dupuytren’s tissue only ??
Radical PIPJ release ??

Capsuloligamentous Release

Useful ?

YES
Lanz 2004
Misra 2007

NO
Weinzweig 1996
Check rein ligaments
Accessory collateral
Flexor sheath
Gentle Manipulation
Volar Plate
Transverse Retinacular
Lateral Bands
Proper Collateral
Worse preop contracture $\approx$ Worse postop outcome

Small finger involvement
Multiple rays

Legge & McFarland, 1980

Comparison of Proximal Interphalangeal Joints With Preoperative Flexion Contracture of More Than 60° Evaluation

<table>
<thead>
<tr>
<th>PIPJ Measurement (degrees)</th>
<th>&lt;60°</th>
<th>&gt;60°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean before surgery</td>
<td>43</td>
<td>79</td>
</tr>
<tr>
<td>Mean after surgery</td>
<td>13*</td>
<td>31*</td>
</tr>
</tbody>
</table>

*p = .017.
44% improvement @ 2yrs

Contracture > 45°
Compliance
Digit involved
Capsular release
Rives & Gelberman, Jhand Surg, 1992

CORD-I*: Increase in Range of Motion

Mean Increase in Range of Motion From Baseline

- Baseline (XIAPLEX)
- Post-treatment (XIAPLEX)
- Baseline (Placebo)
- Post-treatment (Placebo)
CORD-II*: Primary Endpoint Results by Treated Joint
Reduction of MP and PIP Joint Contracture to Within 0° to 5° of Normal 30 Days After the Last Injection†

<table>
<thead>
<tr>
<th></th>
<th>XIAFLEX</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP Joints</td>
<td>65%</td>
<td>9%</td>
</tr>
<tr>
<td>PIP Joints</td>
<td>28%</td>
<td>0%</td>
</tr>
<tr>
<td>All Joints</td>
<td>44%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Patients, %

- n=20
- n=11
- n=21
- n=10

Percutaneous needle Fasciotomy
Mainly for Palmar disease affecting MP joint
Foucher data 3.2 yr FU
79%. MCP 65 % PIPJ 58% recur 24% reop
+ correlation
Correction @ time of surgery and final outcome

<table>
<thead>
<tr>
<th>Intraoperative PIPJ Measurement</th>
<th>Fasciectomy Alone</th>
<th>Fasciectomy and Joint Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight, n</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>Not straight, n</td>
<td>0</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PIPJ Measurement [°]</th>
<th>Fasciectomy Alone</th>
<th>Fasciectomy and Joint Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before surgery</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>After surgery</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

Post op splinting

<table>
<thead>
<tr>
<th>PIPJ Measurement [°]</th>
<th>Compliant</th>
<th>Not Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before surgery</td>
<td>60</td>
<td>68</td>
</tr>
<tr>
<td>After surgery</td>
<td>20*</td>
<td>48*</td>
</tr>
</tbody>
</table>

ROZ EVANS PROTOCOL
CPM

Skirven, Osterman, 1998

< 60°  85 % Improvement @ 1 YR

> 60°  72%

The Digit Widget
Severe PIP Contractures - Thrice Recurrent Disease

Indications:
1. Recurrent PIP contractures in Dupuytren's Disease
   - poor, scarred volar skin

Digit Widget

Applied:
- Two pin into dorsum of middle phalanx
- Hinge and palmar strap attached
- Rubber bands applied and monitored by therapists
Progressive soft tissue elongation via skeletal Traction time course is 8 weeks.

Surgery on 7/7/05
Remove digit Widget,
Release soft Tissues and FTSG

 Courtesy Rod Hentz
Range of motion at 2 months post release of soft tissues and FTSG

Flexion

Extension

Correction is maintained at one year post-op.
18 of the 19 patients were unconditionally satisfied with their experience and would undergo the procedure again.

Roush & Stern, 2000
68% numb, 3/19 anesthetic
Pre and Postop TAM @ final FU
Were similar in most patients
The 4 A's
Acceptance
Arthroplasty
Arthrodesis
Amputation

ARTHRODESIS
Dupuytren’s Disease Symposium

Postop Complications and Management
Peter Stern, M.D.

Educational Objectives

Upon completion, participants should be able to:

• Recognize, classify, and treat early middle term and late complications of Dupuytren’s surgery

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COMPLICATIONS OF DUPUYTREN SURGERY

Peter Stern, M.D.

Complications are proportional to

- Severity of disease
  - PIPJ contracture > 60°
- Number of prior surgeries
- Skill of surgeon
- Overly aggressive surgery

-------- “Dupuytren’s is not a carcinoma”
.......R. Tubiana
Early Complications

- **Hematoma**
- **Skin Necrosis**
- **Infection**
- **Flare Rx/ CRPS**
- **Nerve Injury**
- **Vascular Injury**
  - Failure to deflate tourniquet
  - Secure hemostasis
  - Consider McCash (open palm) incision
  - Can cause flap necrosis
  - Prompt evacuation

- **Incidence:** 2.4-24%
- **Causes**
  - Buttonhole
  - Thin flap
  - Hematoma
Early Complications

- Hematoma
- Skin Necrosis
- Infection
- Flare Rx/ CRPS
- Nerve Injury
- Vascular Injury

- Appropriate antibiotics
- Prompt drainage when indicated

Early Complications

- Hematoma
- Skin Necrosis
- Infection
- Flare Rx/ CRPS
- Nerve Injury
- Vascular Injury

- Flare: swelling, decr. ROM
- Incidence: 2.4-19% (Sennenwald)
- ?? (flare) increase in women
- Simult. CTR and fasciectomy
Early Complications

- Hematoma
- Skin Necrosis
- Infection
- Flare Rx/ CRPS
- Nerve Injury
- Vascular Injury

**INCIDENCE: 1.5-7.8%**
**ALWAYS IDENTIFY NERVE**
- Proximal to distal dissection
**SPIRAL CORD OR SEVERE CONTRACTURE: BEWARE**

Early Complications

- Hematoma
- Skin Necrosis
- Infection
- Flare Rx/ CRPS
- Nerve Injury
- Vascular Injury

- Rare
  - Stretch/spasm:
  - Direct injury

- Flex finger
- Lidocaine or papaverine
- Explore/repair

- Always inform: risk of digit loss
Late Complications

• Recurrence of Contracture
• Extension of Disease
• Flexion Loss
• Dystrophy / Pain Syndrome
• Swan Neck Deformity

“Disease recurrence is an inevitable consequence if the patient lives long enough. Therefore it is debatable whether it should be considered a complication.”

Rate of Recurrence (Dupuytren’s)

<table>
<thead>
<tr>
<th>Year</th>
<th>Study</th>
<th>Patients</th>
<th>Recurrence (%)</th>
<th>Follow-up (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>Hueston</td>
<td>224</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>Adams and Lyons</td>
<td>85</td>
<td>34%</td>
<td>3.5</td>
</tr>
<tr>
<td>1966</td>
<td>Hakstian</td>
<td>51</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>Rodrigo, Niebauer, Brown, Doyle</td>
<td>135</td>
<td>63%</td>
<td>2m-5.5 y.</td>
</tr>
<tr>
<td>1992</td>
<td>Foucher, Cornil, Lenoble (open palm)</td>
<td>107</td>
<td>41%</td>
<td>&gt; 5 y,</td>
</tr>
<tr>
<td>2005</td>
<td>Bulstrode, Jemec, Smith</td>
<td>75</td>
<td>31%</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Recurrent Dupuytren’s Disease
(Tubiana and Leclercq, G.E.M. Monograph, 1985)

- 50 patients w/ avg. f/u 10 years
- All initially had full extension
- Recurrence: 66%; Extension 46%
- Recurrence + Extension 82%
- 16% required a second procedure
Late Complications

- Recurrence of Contracture
- Extension of Disease
- Flexion Loss
- Dystrophy / Pain Syndrome
- Swan Neck Deformity

Schneider and Hankin, JHS, 1986. Incidence: 41 %

Late Complications

- Recurrence of Contracture
- Extension of Disease
- Flexion Loss
- Dystrophy / Pain Syndrome
- Swan Neck Deformity

Prompt recognition and treatment
- Sympathetic blockade
- Therapy
- Medication: Tegretol, calcium channel blockers, steroids
Late Complications

- Recurrence of Contracture
- Extension of Disease
- Flexion Loss
- Dystrophy / Pain Syndrome
- Swan Neck Deformity

Volar Plate release

MULTIPLE LATE COMPLICATIONS
CHRONIC ULCERATION

FTSG  FLEXION CONTRACTURE
LOSS OF FLEXION

Concluding Remarks

• Complications probably under-reported
• Don’t “sell” surgery
• Document informed consent
  — Especially N-V injury, recurrence, stiffness
• Recurrence: not a true complication but very common
THANK YOU
Managing Recurrent Dupuytren’s Disease
Vincent Hentz, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Analyze recurrent disease.
- Review surgical options available to management recurrent disease.

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Scientific Advisory Board: Auxilium Pharmaceuticals
Soft Tissue Distraction Lengthening Followed by Full Thickness Skin Grafting for Severe Recurrent Proximal Interphalangeal Joint Contractures Secondary to Dupuytren's Disease

Vincent R. Hentz, MD
RA Chase Center for Hand Surgery
Stanford University
Stanford, California

Disclosure: Conflict of Interest:

The author has no financial relationship with the manufacturer of any of the devices shown in this presentation
Dupuytren’s Disease  
Recurrence after surgery is common

Recurrent PIP joint contractures are surgical challenges

- Scarred, shortened skin
- Scarred contracted NV bundles
- Peri-articular fibrosis
- Tendon imbalance f/e

Secondary surgery often perilous

- Vascular complication
- Nerve damage
- CRPS
- PIP joint stiffness
- Dead finger

Many reports suggest that there are no or fewer recurrences under full thickness skin grafts

Gonzales 1978
Tubiana & Leclercq 1986
Kelly & Varian 1992
Searle & Logan 1992

Efficacy of dermatofasciectomy still questioned.
Surgery for recurrent PIP joint contractures

Prior paradigm:
Dermatofasciectomy and accept some residual PIP contracture
Salvage: PIP arthrodesis, amputation

Recurrent Contractures

other adjuncts
soft tissue distraction - lengthening
Messina 1986 TEC (technica di estensione continua)

Italian literature, 1989
French literature, 1991
English literature, 1993
Elongation 2 mm/day
Average duration - 2 weeks
Rapid recurrence once device removed
Messina concluded that:
“Elongation must be followed immediately by “limited” fasciectomy”
Little published about soft-tissue distraction for Dupuytren’s

Agee Digit Widget

Potential benefits:
Ease of use
Slow distraction, reduced joint injury
Joint able to actively flex

Design attributed
To Famy
Initial procedure
Out-patient
Wrist block
10 minutes
Insert proximal pin

Insert distal pin

Attach frame

Cut pins
Case of Dr. John Agee

This patient has recurrent Dupuytren's contracture.

3 weeks

6 weeks

23 weeks
Case from Dr. Robert Salter

1 to 3 fingers
Active flexion
Continuous passive extension
Thrice recurrent ring PIP contracture

Pre-surgery PIP
ROM = 75 - 90

Digit Widget
applied

Rubber bands
monitored by
therapists

Progressive
soft tissue
elongation
via skeletal
Traction
time course is
8 weeks
Progressive soft tissue elongation via skeletal traction

Time course is 8 weeks

Second surgical procedure:

Regional anesthesia
Excise damaged, scarred, thin skin over proximal phalanx
Excise residual (now elongated) fascia
Protect NV bundles
FTSG from groin crease - bolster dressing
Digit widget left in place
ROM begins at 4th PO Day
Digit widget acts as dynamic extension splint
Digit widget removed in clinic at 2 weeks PO
Surgery on 7/7/05
Remove Digit Widget,
Excise skin and residual fibrous tissue
FTSG

Range of motion at 2 months post release of soft tissues and FTSG
Flexion = 90°
Range of motion at 2 months post release of soft tissues and FTSG

Extension = 15°

3 years post-op.
ROM = 20/95
No evidence of recurrence

We now leave the digit widget on following FTSG to assist in early rehabilitation

3 prior releases
PIP = 70/85

6 weeks of distraction PIP = 15/80

FTSG
4th procedure
Preop PIP 70/90
Postop (10 months) PIP 25/95

Three previous procedures
Two year followup
Results

Subjects: 7 patients, 11 digits 2005-09
Previous surgery for target digit(s): 2-5
Pre-op PIP contracture averaged 75°
Distraction time: 4-8 weeks
10 digits achieved near-full extension with DL
1 patient became “impatient” and accepted < full DL course

Results

No loss of FTSG
No “white fingers” after skin/fascia excision and FTSG
Minimal transient change in sensation
No pin-track infections
No CRPS
Post-op active PIP ROM extension: 15 (0-25)
flexion: 85 (80-95)
Conclusion:

Preliminary soft-tissue lengthening, followed by skin excision and FTSG has reduced complications and yielded early satisfactory functional outcomes in severely contracted, previously operated digits.

No white fingers at surgery. Flexion maintained
Early, mild loss of some PIP extension - stabilizes

Longer term assessment still in progress
Dupuytren’s Disease Symposium

Treating Dupuytren’s Nodules
Lynn Ketchum, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Describe the response of the nodule in Dupuytren’s Disease to various compounds, including Triamcinolone, Verapamil, PGE2 and Decorin.
- Provide the dosage, technique of injecting and complication associated with Triamcinolone injections.

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THE NODULE IN D.D IS ANALOGOUS TO A
KELOID, WHICH EXCEEDS THE BOUNDARY OF
THE ORIGINAL LESION. TRIAMCINOLONE HAS
BEEN SHOWN TO SOFTEN AND FLATTEN
KELOIDS.
TRIAMCINOLONE: 9 ALPHA FLOUROHYDROCORTISONE

• DOES NOT DIRECTLY DEGRADE INSOLUBLE COLLAGEN.

• WHEN ADDED TO COLLAGENASE IN VITRO, IT DOUBLES THE YIELD OF SALT SOLUBLE COLLAGEN WHICH IS EXTRACTED BY COLLAGENASE ALONE.

• TRIAMCINOLONE POTENTIATES THE ACTIVITY OF COLLAGENASE.
• THE IN VIVO INJECTION OF TRIAMCINOLONE INTO RAT TAIL TENDONS RESULTS IN THE DEGRADATION OF INSOLUBLE COLLAGEN INTO SALT SOLUBLE COLLAGEN WHICH IS EXCRETED.
• TRIAMCINOLONE BLOCKS THE ACTION OF ALPHA-2 MACROGLOBULIN, A TIMP.
• HYDROCORTISONE CONVERTS INSOLUBLE COLLAGEN INTO ACID SOLUBLE, WHICH IS NOT EXTRACTED OR EXCRETED.
TRIAMCINOLONE AFFECTS THE MACROPHAGE/FIBROBLAST/COLLAGEN CASCADE IN A DOSE DEPENDENT MANNER, SIMILAR TO THE EFFECT OF ANTI-MACROPHAGE SERUM. IN BOTH INSTANCES, IF MACROPHAGE PRODUCTION IS BLOCKED, THE CASCADE IS HALTED AND FIBROBLAST AND COLLAGEN PRODUCTION ARE SIGNIFICANTLY REDUCED.

MEEK, McLELLAN, REILLY AND CROSSAN DEMONSTRATED A REDUCTION IN FIBRONECTIN, PRO-INFLAMMATORY CYTOKINES AND TGF\(\beta\) PRODUCTION IN DUPUYTREN'S TISSUE AFTER STEROID TREATMENT, BY DECREASING TRANSENDOTHELIAL MIGRATION OF INFLAMMATORY CELLS AND THE REPRODUCTION OF SUCH CELLS AT THE SITE OF DISEASE.
BECAUSE OF THE ABOVE EFFECTS,
TRIAMCINOLONE, WHEN INJECTED INTO THE
SKIN EDGES OF HYPERTROPHIC SCARS AND
NODULES, RETARDS OR PREVENTS RECURRENCE
AFTER SURGICAL EXCISION. CONVERSELY,
NODULES OF D.C. CAN BE SEEN IN PALMS
AFTER SURGICAL PROCEDURES ON THE HAND
SUCH AS TRIGGER FINGER FINGER RELEASES.
INJECTION PROTOCOL

- A SERIES OF THREE INJECTIONS SIX WEEKS APART
- IN MEN, UP TO THREE CC(120 MG) ARE INJECTED INTRALESIONALLY IN ONE OR MORE NODULES PER SESSION
- IN WOMEN, UP TO TWO CC(80 MG)
INDICATIONS FOR TRIAMCINOLONE INJECTIONS:

• NATURAL HISTORY OF PROGRESSION OF THE DISEASE AS SHOWN BY MILLESI.

• PRO-ACTIVE APPROACH TO RETARD THE PROGRESSION OF THE DISEASE, RATHER THAN WAITING FOR THE DEVELOPMENT OF A 20° CONTRACTURE AT THE MP OR PIP JOINT.

• FORTY YEAR EXPERIENCE WITH TRIAMCINOLONE INJECTIONS INTO D.D. NODULES SHOWED A 93% RESPONSE IN SOFTENING AND FLATTENING OF INJECTED NODULES.

INTRALESIONAL TRIAMCINOLONE INJECTION STUDY

● 75 HANDS IN 63 PATIENTS WERE INJECTED OVER A FOUR PERIOD AND WERE FOLLOWED AN AVERAGE OF 41.3 MONTHS
● THERE WERE 3.15 INJECTIONS PER AREA OF DISEASE
● 62 OF 63 PTS OBSERVED A SIGNIFICANT REGRESSION IN THEIR LESIONS
● ONE PT REQUIRED A DERMOFASCIECTOMY AND WOLFE GRAFT
● THE PRESENCE OF THE DUPUYTREN'S DIATHESIS HAD NO BEARING ON THE PTS RESPONSE
WHAT ABOUT?

• PLANTAR NODULES.

KNUCKLE PADS.

MULTIPLE, AGGRESSIVE, FAST GROWING NODULES.

THE EFFECT OF TRIAMCINOLONE ON JOINT CONTRACTURE.

INJECTION OF A NODULE AFTER XIAFLEX INJECTION OF A CORD.
WHAT ABOUT?

PLANTAR NODULES.

• KNUCKLE PADS.

MULTIPLE, AGGRESSIVE, FAST GROWING NODULES.

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WHAT ABOUT?

PLANTAR NODULES.

KNUCKLE PADS.

MULTIPLE, AGGRESSIVE, FAST GROWING NODULES.

THE EFFECT OF TRIAMCINOLONE ON JOINT CONTRACTURE.

• INJECTION OF A NODULE AFTER XIAFLEX INJECTION OF A CORD.
ADDITIONAL NON-SURGICAL Rx OF NODULES:
BADALAMENTE AND HURST HAVE SHOWN THAT PGF2 IS A POTENT AGONIST OF THE CONTRACTILE MECHANISM IN D.C., BUT PGE2 IS A POTENT ANTAGONIST, CAUSING RELAXATION OF CULTURED FIBROBLASTS BY ACTIVATING ADENYLATE CYCLASE AND INCREASING cAMP LEVELS. PATIENTS WITH R.A. ON HIGH DOSES OF ANTI-INFLAMMATORY MEDS WHICH INHIBIT THE PROSTAGLANDIN CASCADE RARELY DEVELOP DUPUYTREN'S CONTRACTURE.

LEE ET AL. HAVE SHOWN THAT DIRECT INJECTION OF VERAPAMIL INTO HYPERTROPHIC BURN SCARS RESULTED IN SCAR SIZE REDUCTION THROUGH ITS ACTION AS A CALCIUM CHANNEL BLOCKER, WHICH PREVENTS THE INTRA-CELLULAR BUILD-UP OF CALCIUM THAT TRIGGERS THE ACTIVATION OF THE ACTIN/MYOSIN COMPLEX.
RAYAN SUGGESTS THAT SINCE LPA IS RELEASED BY PLATELETS, TREATMENT OF WHOLE BLOOD WITH PHOSPHOLIPASE B, WHICH BREAKS DOWN LPA, MAY BLOCK SERUM PROMOTED CONTRACTION

HSU AND CHANG HAVE FOUND THAT SOME OF THE EFFECTS PRODUCED BY TGFβ1 ARE INACTIVATED BY DECORIN WHICH IS A NATURAL INHIBITOR OF TGFβ1.
Dupuytren’s Disease Symposium

Closed Fasciotomy and Needle Fasciotomy
Avrum Froimson, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Discuss history of percutaneous release.
- Identify technique of needle aponeurotomy.
- Review criteria for patient selection.
- Discuss results and complications.

Disclosure Statement

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Educational Objectives

Upon completion, participants should be able to:

- Identify recurrence rate and management.
- Evaluate complications and management.

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NEEDLE APONEUROTOMY
for
DUPUYTREN’S
CONTRACTURE

Avrum I Froimson, MD
Section of Hand Surgery
Orthopaedic Department
Cleveland Clinic
DUPUYTREN’S DISEASE

Genetic
Nordic Origin Theory
Anglo-Saxon, Norman, Baltic, German
Males > Females
Plantar fibromatosis
Peyronie’s Disease - Buck’s Fascia
Triggers ?? Epilepsy, Trauma, Drugs,
Hand Surgery
HISTORY

1822 London   COOPER
   Subcutaneous Fasciotomy
1831 Paris   DUPUYTREN
   Open fasciectomy
1844 Boston  MORTON
   Ether Anesthesia
   Total Fasciectomy
1959 Luck
   11 Blade fasciotomy

EVOLUTION
Surgical Technique

Fasciotomy
Total Fasciectomy
   Close Incision
   Skin graft
   Mc Cash Open palm method
Partial Fasciectomy
   Z-plasty
   Zigzag incision
   Needle Aponeurotomy
NON SURGICAL

Injection
Steroids
Collagenase

Mechanical
Digit Widget
Needle Aponeurotomy

There is No CURE for Dupuytren’s Disease just REMEDIES.
NEEDLE APONEUROTOMY

1980 Lermusiaux
   Paris Rheumatologist
2001 Foucher
   Strasbourg, France
   ASSH Member
2006 Van Rijssen
   Netherlands
2006 Eaton
   ASSH meeting Instructional Course
LEARNING

Visiting Hand Surgeons
Hand Center, Jupiter, Florida
Charles Eaton, MD
High volume NA
8 year experience
Well documented
Good results

Question ?

WHY DO NA ?
Office not OR
Local not Block/General
Reduce Cost = 1/5th
Therapy Rarely
Minimal Pain No Rx
Rapid RTW
No CRPS, Flare
No CRPS

Eaton

“The wrench in the works of Dupuytren’s procedures is the reaction to skin wounding.”

- Minimal with NA or Collagenase

Innovations

Driven by patient demand for quicker recovery, less complex treatment options, lower cost.

e.g. Arthroscopic vs open RC repair
- Partial vs TKR
- Micro discectomy
- Minimally invasive THR
Early Cases

Now all Supine
Technique

Patient at Sink washes hand 3 times
Supine on exam table, arm on board
Photos pre NA
Chlorhexidine Gluconate skin prep
Small skin wheals 2 percent lidocaine via 30 gauge needle
One site at a time
Preserve finger sensation to detect shock
Sterile Field

25 gauge 5/8 inch needle on 3ml syringe
Bevel at right angle to cord
Multiple stabs then swipe across cord
Redirect if patient feels paresthesia
Multiple portals
- Start distal work proximal
Maintain extension pressure on finger
Finger gradually straightens
The needle

30 gauge local  25 gauge

Change needles often
Repeat chlorhexidine prep often
Rest periods for patient
Frequent sensory and flexor tendon exam
Final Photo
Dressing
Post op instruction sheet
Follow up visit or Email with photos
Video

Change dressing in AM
Pain Control

Tylenol and/or Ibuprofen
No narcotics
Ice 10 Minutes each ½ hour times 12
Elevation
Exercise and stretch
Splint prn
Night splint prn x 1 or 2 months if severe

contracture
Contraindications

I DO NOT DO NA
IF
Broad thick cords only
Dense scar recurrence
after open surgery
My Cases

200+ cases first 3 years
90 % men
Age Range 45 to 82
1/2 from a 500 mile radius
Send email photos before they travel here
1/2 local patients
Billing

CPT Code 26040  
Percutaneous Fasciotomy

45 percent Medicare  
a “HAND” code  
Bill for one even if multiple digits

Commercial insurance  
code each finger

RESULTS
Learning Curve

Start by doing cases with thinner discrete cords causing only MP flexion contractures with no previous surgery

Ideal First Case
Thicker cord but OK

Next Step
77 y o Blind Attorney

Complications

Skin tears     5
Numbness ,partial  3
Infection   1 Deep, 1 superficial
Flexor tendon ruptures 2
Skin Tear

3 Weeks--Healed
FDP Rupture 4 weeks later grasping tree branch to prevent fall

Fasciectomy Recurrence

50% in 5 years

- Repeat fasciectomy
- Skin graft
- Amputation
Repeat fasciectomy hazards

French report  50% 3 years
Gary Pess  ASSH 2008
  f/u min 2.5 years
  81% MP    50% PIP
  retained over 50% correction
Van Rijssen  5 years  85 %

NA Recurrence
My Cases

First 100 patients
2 year follow up
6 repeat NA easy to redo
One fasciectomy
All glad they did NA first time

ASSH List Serve

Charlie Eaton
“\[I am confident I could generate less than 10\% 10\text{ year recurrence after NA if I reported a series of patients with normal blood sugar, negative extended family history, nonsmoker, unilateral, no knuckle pads/Peyronies/frozen shoulder, mild contractures, soft skin, thin cords, no nodules, age over 60 at first presentation.}]]}
NEEDLE APONEUROTOMY

A useful addition to a Hand Surgeon’s Tool Kit

LIFE IS GOOD
THANK YOU
The nodule in Dupuytren’s disease is analogous to a keloid, which exceeds the boundaries of the original lesion. The treatment of keloids with Triamcinolone has been shown to flatten and soften them, and was the stimulus for the extension of its use to nodules of Dupuytren’s disease (Figs. 1A & B). From the use of Triamcinolone in hypertrophic scars and keloids, the following information has been obtained:

Triamcinolone does not directly degrade insoluble collagen, but when added to collagenase (clostridium histolyticum) and incubated with insoluble collagen, Triamcinolone doubles the yield of salt soluble collagen that was obtained by collagenase alone by potentiating the activity of collagenase in the degradation of insoluble collagen.

In vivo, the injection of rat tail tendons, which are composed mainly of insoluble collagen, and are reminiscent of the cords of Dupuytren’s contracture by their tendinous appearance, is informative. The injection of them with Triamcinolone yields a certain percentage of salt-soluble collagen through its potentiating of collagenase activity, which activity is the maintainance of a steady state of collagen in the adult rat through the
degradation of an amount of insoluble collagen equal to the amount of new collagen that is produced by fibroblasts; in addition, Triamcinolone blocks the action of alpha-2 macroglobulin, one of the of TIMPs (tissue inhibitors of metalloproteinases, i.e. collagenases); salt-soluble collagen is derived from this degradation and is extracted by serum and excreted. The injection of Hydrocortisone into rat tail tendons does not yield salt-soluble collagen, but rather, acid soluble collagen, which is not extracted and excreted, but remains in the tail as acid soluble collagen (Fig. 2). This is why hydrocortisone is ineffective in reducing the size and hardness of hypertrophic scars, as well as Dupuytren’s nodules. It is the fluoridation of the hydrocortisone molecule at the #9 position that makes the difference in effectiveness and makes Triamcinolone 9-alpha-flouro-hydrocortisone.

In addition to its effect on collagen, Triamcinolone affects the macrophage > fibroblast > collagen cascade in a dose dependent manner, which is similar to the effect of administering anti-macrophage serum.

In both cases, fibroblast and subsequent collagen production are pre-empted by blocking macrophage production. It has repeatedly been observed that with the administration of an adequate dose of Triamcinolone to produce the effect, one can re-open a wound three weeks later, and observe the
appearance of a wound one would expect to see sixty minutes after wounding with a few neutrophils, but virtually no macrophages, fibroblasts or collagen.

Meek, McLellan, Reilly, and Crossan have demonstrated reduction in fibronectins, pro-inflammatory cytokine production and TGFβ-1 production in Dupuytren’s tissue after treatment with steroids by decreasing the transendothelial migration of inflammatory cells and by reducing local reproduction of cells already present at the inflammatory site, all of which play a role in inflammatory cell apoptosis.\textsuperscript{4}

The above effect explains why Triaminolone, when injected into wound edges after excision of a keloid or hypertrophic scar, retards or prevents recurrence of those lesions\textsuperscript{5}(Figs. 3A & B). This has obvious implications on the recurrence of Dupuytren’s disease after fasciectomy\textsuperscript{6,7,8}(Figs. 4A & B).

Regarding the practical application of Triamcinolone in the treatment of the nodule, it is as follows:

First, in our practice, the indication for the intra-lesional injection of Triamcinolone is based on the natural history of the disease as observed by Millesi, who showed that in five years fifty percent of individuals with a nodule will develop progression of the disease beyond stage zero, i.e. the nodule alone, and that in ten years there would be a joint
contracture, and that in fifty percent of cases there will be bilateral disease⁹. The almost universally taught dictum is to wait until there is a twenty degree joint contracture, at which time some type of surgical release of the contracture would be recommended. Based on our forty year experience with intra-lesional injections of Dupuytren’s nodule with Triamcinolone, we recommend a more pro-active approach.

We studied a four year window into that experience and found that 93% of pts. so injected experienced softening and flattening of there nodules, some complete, but usually there was some residual amount of nodule present(Figs. 6A-D); even so, what happened in the great majority of cases was a moratorium on the progression of the disease, in one case over thirty years(Fig. 7). The usual scenario is that there is reactivation of the nodule in one to three years; nevertheless, prompt re-injection, more often than not, returns the nodule to a quiescent state. The smaller the nodule when first treated, the more satisfactory the response. Many of you have heard patients say that the nodule appeared “over night” or within a few days. In this slide, we see a 53 year old female who has had satisfactory resolution of the nodules of her right over the last two years, which also included resolution of a knuckle pad treated intralesionally with Triamcinole(Fig. 8). On March the 10th of this year she was certain that there were no nodules in her left hand;
but, on March 11\textsuperscript{th}, she noticed the presence of three small nodules at the distal palmar crease of her left palm in line with the ring finger; they were injected with 80 mg. of Triamcinolone on March 16\textsuperscript{th}. My personal experience was similar. I developed a nodule on each palm, at the distal palmar crease, in line with the ring finger, about a year apart, first on the left and then on the right. I was fairly certain the nodules were not there the day before I noticed them. In each case, the nodules were injected with eighty mg. of Triamcinolone the same day that they were discovered. Triamcinolone is relatively slow acting. It took about a month for the nodules to resolve. In my left palm, the nodule recurred in about six months and was promptly re-injected and hasn’t recurred in over a year. The nodule in the right hand has not recurred in over a year.

In both palms, I experienced the two most common side effects of Triamcinolone injections, namely, mild atrophy and depigmentation of the surrounding skin. Both conditions resolved in four to six months. Currently there is no sign of Dupuytren’s disease in either hand. I welcome anyone interested to examine the palms of my hands. I have had quite a few members of the Hand Society write to me or come up to me and relate similar reports of their patients. In over ten thousand injections during that forty year period, I have seen two flexor tendon ruptures, both in
women and in both cases I did not adhere to our recommended protocol of waiting six months before re-injecting, after a series of three injection six weeks apart.

After the patient is diagnosed with a nodule of Dupuytren’s disease, he or she is informed of the natural history of the disease, and given the option of watchful waiting or proceeding with a series of injections. If they desire to proceed with the injections, an area proximal to the nodule is injected with Lidocaine. This is recommended for two reasons; first, because the skin of the palm is richly endowed with nerve endings, and because it is important to inject the Triamcinolone intra-lesionally and not into normal tissues, a patient with a local anesthetic injection will sit quietly while the Triamcinolone is injected, and not move his or her hand in anticipation or response to pain. Second, if Lidocaine is mixed with the Triamcinolone when the injection is performed, there is not enough time for the Lidocaine to become effective and the patient’s hand may move; in addition, the Lidocaine precipitates the Triamcinolone, making it less effective. A simple band-aid covers the injection site and the patient is told that the injection site may be tender for twentyfour hours. Some patients respond readily to one or two injections, but most require three. Regarding dosage, for smaller nodules 40 to 60 mg. of Triamcinolone is injected; for larger nodules, 80 to 120 mg. are used. In a
large man 160 mg. can be given. In women 100 mg. is usually the maximum
dose, because of temporary adrenal suppression.

With this dosage schedule, we have not observed any untoward systemic
signs or symptoms. Patients with diabetes mellitus are warned that their blood
sugar will be elevated for three to four days. After the third injection, the
patient is asked to return in six months to determine whether an additional
injection is indicated. In our series, less than ten percent of patients did not
respond to the injections.

In patients with large multiple nodules, or aggressive fast-growing
disease, we do not recommend the injection, but rather recommend
dermofasciectomy and full thickness graft(s)\(^{10}\) (Figs. 9A-C).

Intralesional injections with Triamcinolone into planter nodules or
knuckle pads are very effective, Surgical excision is not recommended
for planter nodules, as the patient would be applying weight to a scar in a
dependent position (Fig. 10). Excision of knucke pads is also not
recommended because motion at the PIP joint post-operatively is
painful and healing may be slow, and knuckle pads also respond readily to
intra-lesional Triamcicole injectins (Fig. 11).

As is well known, nodules of Dupuytren’s disease are not usually
painful; however, at the distal palmar crease, the disease process can follow
the bands of Ligeau and Juvara down along each side of the first annular pulley. When contracture of the diseased tissue occurs, stenosis of the first annular pulley can occur, producing friction between the flexor tendons and pulley, resulting in inflammation, pain, crepitus, decreased range of motion, and eventual triggering. The above can occur simultaneously with a nodule in the skin or subcutaneous tissue in that area, and that condition usually responds favorably to a Triamcinolone injection in the nodule and superficial to the pulley.

Finally, some patients will request excision of a nodule, perhaps at the time of a trigger finger release. At that time, in addition to excising the nodule and releasing the A-1 pulley, a Z-plasty can be performed to decrease mechanical tension on the skin, and the wound edges can be injected with Triamcinolone to beneficially modify the inflammatory phase of wound healing and decrease the chance of recurrence of the nodule, as seen in this patient’s palm, as seen in figures 4A&B.

Although Triamcinolone has minimal effect in producing release of an established contracture in a cord, it is very feasible to inject the associated nodule with Triamcinolone at the time of or after the cord has been released by a Xiaflex injection, for the purpose of decreasing the rate of recurrence(Fig. 12).
Other non-surgical treatments or proposed treatments of nodules of Dupuytren’s disease are:

Recent evidence implicates nitric oxide as a primary inducer and secondary messenger in intracellular signal transduction pathways involved in inflammatory cell apoptosis, as shown by Jacon et al.\textsuperscript{11}. Increased TGFb-1 and IL-1 levels are known to increase inducible nitric oxide synthase in macrophages and vascular smooth muscles; that enzyme catalyses L-Arginine into nitric oxide, which, in turn, decreases several collagenases. Of relevance is that under ischemic conditions nitric oxide combines with superoxide free radicals to form peroxynitrite, which decomposes to harmless nitrogen dioxide and the damaging hydroxyl free radical. The effect of steroids on nitric oxide has yet to be studied, however drugs now exist that alter free radical formation. The body produces several antioxidant enzymes including superoxide dismutase(SOD), catalase, and glutathione peroxidase that neutralize many types of free radicals. Oral absorption is minimal; however, intralesional injection of them is an attractive possibility as the neutralization of free radicals is of importance in treating the disease at its inception.

It is known that it is unusual for patients with collagen diseases such as Rheumatoid arthritis to have Dupuytren’s disease. These patients are usually on high doses of anti-inflammatory medications.
Badalamente and Hurst have shown that whereas the prostaglandin PGF2α is a potent agonist of the contractile mechanism in Dupuytren’s contracture, PGE2 is a potent antagonist of the contractile mechanism, causing relaxation of cultured fibroblasts by activating adenylate cyclase and thus increasing cAMP levels\textsuperscript{12}.

Lee et al. showed that direct injection of Verapamil into hypertrophic burn scars resulted in scar size reduction, through its action as a calcium channel blocker, and presumably blocking activation of the Actin/Myosin complex\textsuperscript{13}. Nifedipine, another calcium channel blocker, is projected to have a similar effect.

Rayan suggests that since LPA is released by platelets, that treatment of whole blood with phospholipase B, which breaks down LPA, would block serum promoted contraction\textsuperscript{14}.

Sanderson has shown that patients with Dupuytren’s disease have significantly higher serum cholesterol and triglyceride levels than normal; alcoholism is associated with elevated triglyceride levels, but with decreased levels of PGE. Rayan suggests that these two factors acting in concert may play a significant role in the contracture of the palmar fascia, and that treatment of them could be very beneficial in multiple areas of their metabolism\textsuperscript{15}. 
Murrell pointed out that treatment with Allopurinol, which is a xanthine oxidase inhibitor, improved the contractures of several patients over a two year period, but Hueston found equivocal changes in a larger group of patients.

Tomasek, Vaughn, and Haaksma found that Interferon-g (IFN-g), a cytokine produced by T-helper lymphocytes can decrease alpha-smooth muscle actin and mRNA expression in cultured fibroblasts, and can block TGFβ-1 promoted changes in palmar fascia fibroblasts and Dupuytren’s myofibroblasts and this also includes assembly of fibronectin fibrils and formation of fibronexus adhesion complexes. It also suppresses the generation of contractile force; in preliminary clinical results, IFN-g decreases the size and symptoms hypertrophic scars and Dupuytren’s nodules.

BIBLIOGRAPHY


ILLUSTRATIONS

LEGENDS OF TREATMENT OF THE NODULE IN D.C.

Figs. 1A & B. Pre-auricular keloid pre and post injection with Triamcinolone.

Fig. 2. Structures of Triamcinolone and Hydrocortisone.
Figs. 3A & B. Post circumcision keloid and six months after excision of keloid and injection of wound edges with Triamcinolone.

Figs. 4A & B. Nodule of palm producing mild contracture, and after excision with Z plasty and injection of wound edges with Triamcinolone.
Figs. 6A-D. two patients with nodules of the palm shown six months after a series of two intralesional injections with Triamcinolone.
Fig. 7. Patient showing post injection resolution of nodules in right hand and pre injection of newly acquired nodules in the left hand.

Fig. 8. Unusual case of forty year post-injection resolution of nodule, left hand without recurrence. Reactivation usually occurs in one to two years, requiring one or more additional injections.
Figs. 9 A-C. Top illustrates dermis and fascia specimen after dermofasciectomy. Below shows another patient pre and six months post-op dermofasciectomy and full thickness graft of the right palm.
Fig. 11. Knuckle pads on the right hand have resolved after Triamcinolone injections. Knuckle pads on the left hand are pre injection. Knuckle pads heal slowly and painfully after surgical excision.

Fig. 12. Plantar nodule of right foot is pre injection with Triamcinolone, and the nodule of the left foot is post injection.
Fig. 13. Although Triamcinolone is not effective in releasing contractures such as the above, it is feasible to inject it into the nodule proximal to the cord after xiaflex cordotomy to retard recurrence of the contracture.
Dupuytren’s Disease Symposium

Enzymatic Fasciectomy Development
Marie Badalamente, Ph.D.

Educational Objectives

Upon completion, participants should be able to:

• Discuss the FDA regulated Phase 2 and Phase 3 double-blind controlled trial of collagenase injection for the contractures of Dupuytren’s disease.
• Evaluate results of investigational treatment/adverse events of collagenase injection for the contractures of Dupuytren’s disease.

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ENZYMATIC FASCIOTOMY: DEVELOPMENT

Marie A. Badalamente, PhD
Lawrence C. Hurst, MD

Department of Orthopaedics
SUNY@ Stony Brook

Disclosures

• Auxilium Pharmaceuticals
  • Research Investigator- CORD I Clinical Trial
  • Consultant

• Biospecifics Technologies
  • Partial Royalty Rights
Minimally Invasive Treatment

- An acute nonsurgical therapy
  - Multiple collagenase subtypes
  - Not immunologically cross-reactive
- Enzymatic fasciotomy
  - Cord rupture

Preclinical Safety

- Rat Tail Tendon Model
  - 150 “units” — 0.054 mg
  - 300 “units” — 0.108 mg
  - Controls

- No serious adverse extravasation to adjacent collagen-containing tissues
- Collagen lysis of injected tendon
Preclinical Efficacy

• Biomechanical Study—in vitro
  – 20 cords tested to failure (rupture)
  – 150, 300, 600 units
  – 300 units (0.108 mg)
    • Minimum effective dose

Pilot Phase 2 Study: 35 Patients
(Open-Label Dose Escalation)

• 300, 600, 1200, 2400, 4800, 9600 units
  – Provided no clinical benefit
  – 10,000 units (0.58 mg) provided safe correction to 0°-5° extension
Pilot Phase 2 Study: 35 Patients
(Open-Label Dose Escalation) (Cont)


Phase 2a Study

- Randomized, double-blind, placebo-controlled study with open-label extension (n = 49; 0.58 mg)

MP = metacarpophalangeal; PIP = proximal interphalangeal.
Phase 2b Study: 80 Patients

- Multicenter: SUNY Stony Brook/Stanford (VR Hentz, MD)
- Randomized, double-blind, dose-response, placebo-controlled study
  - 1 injection of 2500 (0.145 mg), 5000 (0.29 mg), or 10,000 (0.58 mg) units vs placebo
  - End point: 0°-5° of normal extension 30 days after injection


Phase 2b Study: 80 Patients
(10,000 Units [0.58 mg] = Minimum Safe/Effective Dose)

MP Joints  
\( n = 55 \)

<table>
<thead>
<tr>
<th>Days After Injection</th>
<th>Placebo</th>
<th>2500 units of collagenase</th>
<th>5000 units of collagenase</th>
<th>10,000 units of collagenase</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>0</td>
<td>10</td>
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<td>36</td>
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<tr>
<td>30</td>
<td>0</td>
<td>10</td>
<td>35</td>
<td>36</td>
</tr>
</tbody>
</table>

\( P = .0002 \) vs placebo

MP = metacarpophalangeal; PIP = proximal interphalangeal.

Phase 2 Safety

- Minor, transient adverse events
  - Injection site tenderness, hand ecchymosis, and edema
  - Mean time to resolution, 1-2 weeks
  - No adverse immune events

- Phase 2 FU- 5 yrs.....MP ~ 10%, PIP ~23%

Single-Center Phase 3 Study: 35 Patients

- Randomized, double-blind, placebo-controlled study with open-label extension
  - Up to 3 injections of 10,000 units (0.58 mg) collagenase or placebo
  - Randomized 2:1 (collagenase:placebo)

- End point: 0°-5° of normal extension 30 days after last injection

70-Year-Old Male: Bilateral Disease

Collagenase Option for Reduction of Dupuytren’s (CORD) I Study—Phase 3

- Prospective multicenter, phase 3 clinical trial that evaluated the efficacy and safety of collagenase (*clostridium histolyticum*)
- Randomized, 90-day, double-blind, placebo-controlled study
  - 16 sites in the United States
  - 5 sites in Australia (CORD II)
CORD I: Study Design

Contractures (≥20° to 100° for MP joints and ≥20° to 80° for PIP joints) in MP, PIP, or both joints

Joints Stratified by Severity

- MP ≤50°
- MP >50°
- PIP ≤40°
- PIP >40°

Randomization 2:1 to Collagenase (0.58 mg) or Placebo

Maximum of 3 injections per cord

End of Double-Blind Study (Day 90)

Finger Extension (1 Day After Injection)
CORD I: Joint Characteristics

- 306 primary joints analyzed for efficacy
  - Treatment: 203 received collagenase, 103 received placebo
  - Joint distribution: 202 MP joints, 104 PIP joints

Efficacy Primary End Point
(0° – 5° Normal Extension)

CORD I Investigators

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Thank You

• Food and Drug Administration (FDR01437)
• National Institutes of Health (M01RR10710)
• Biospecific Technologies
• Auxilium Pharmaceuticals
Educational Objectives

Upon completion, participants should be able to:

- Discuss the proper storage requirements for the collagenase product.
- Identify the reconstitution procedures for the collagenase product.

Disclosure Statement

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Wayne Patterson, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
Wayne Patterson, R.Ph., MPS
Research Coordinator
Pharmacy Department
Stony Brook University Medical Center

Learning Objectives
Proper Storage
Reconstitution
Storage

Must be stored in refrigerator at 2° – 8°C  
(36° – 46°C)

Must be reconstituted before use

Reconstitution

• Collagenase (Xiaflex™) is provided in a two vial package
• A vial of active drug as a lyophilized powder
• A vial of diluent
Reconstitution

• Before reconstituting, remove the two vials from the refrigerator and allow the two vials to stand at room temperature for at least 15-20 minutes but no longer than 60 minutes.
• Using aseptic techniques, swab both vials with sterile alcohol (no other antiseptics should be used).
• Use only the supplied diluent for reconstitution.

Reconstitution

• Using a hubless 1mL syringe with a fixed 27-gauge ½-inch needle, withdraw a volume of diluent as follows:
  • 0.39mL for cords affecting a MP joint or
  • 0.31mL for cords affecting a PIP joint
Reconstitution

• Inject the diluent slowly into the sides of the vial containing the lyophilized powder of collagenase.

• Do not invert or shake the vial. Slowly swirl the vial to ensure completion of the collagenase into solution.

• The reconstituted collagenase solution can be kept at room temperature for up to one hour or refrigerated for up to four hours prior to administration.

• If the reconstituted collagenase solution is refrigerated, allow the solution to return to room temperature for approximately 15-20 minutes prior to administration.
Just Prior To Administration

• Discard the previously used syringe and needle that was used for preparing the solution for injection. At the same time you may discard the used diluent vial.

Just Prior To Administration

• Inspect the reconstituted collagenase solution
• It should be clear in appearance
• Look for particulate matter and any discoloration

If the solution contains particles, is cloudy, or is discolored

**DO NOT** inject the reconstituted solution
Just Prior To Administration

• Use a new hubless 1mL syringe with a fixed 27-gauge ½ inch needle for administration.
• Withdraw the following dose of reconstituted collagenase solution:
  • For a cord affecting a MP joint – 0.25mL or
  • For a cord affecting a PIP joint – 0.20mL
• You are now ready to inject.

QUESTIONS
Dupuytren’s Disease Symposium

Injection and Manipulation Techniques
Lawrence Hurst, M.D.

Educational Objectives
Upon completion, participants should be able to:

• Teach proper cord exam and injection site location.
• Review injection technique and pitfalls.
• Demonstrate manipulation techniques and discuss potential complications.

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Auxilium Pharmaceuticals: Primary Investigator and Consultant
Dupuytren’s Disease

Injectable Collagenase: Injection Technique Manipulation Technique

Lawrence C. Hurst, MD

University Hand Center
Department Of Orthopaedics

---

Dupuytren’s Disease

Financial Disclosures:
- **Research support** (preclinical, Phase 2 and single center Phase 3) received from FDA, NIH, Biospecific Technologies.
- Phase 3 multi-center funded by Auxilium Pharmaceuticals
- **Consulting arrangement** with Auxilium Pharmaceuticals
- **SUNY Stony Brook** will receive ½ % royalties from Auxilium Pharmaceuticals
- Presentation will include discussion on the use of collagenase clostridium histolyticum, an FDA approved product sold by Auxilium Pharmaceuticals
Collagenase is an optimized mixture of Clostridial collagenases intended to effectively and safely degrade and weaken collagen in Dupuytren’s cords.

Injection Technique:

1-mL insulin syringe with a fixed 27-gauge

Carefully define Specific Target Area of Each Cord For Each Joint!

The entire injection process typically takes about 60 seconds.
Dupuytren’s Disease
Injection Technique

Ultrasound

Carefully define Specific Target Area of Each Cord For Each Joint!

Distal End Of Cord

Proximal End Of Cord

Area of Maximal “Bowstringing” (Separation of Cord and Flexor Tendons)

Skin Preparation

Dupuytren’s Disease
Injection Technique.

Stony Brook University Hospital Care
Dupuytren’s Disease
Injection Technique

1-mL insulin syringe with a fixed 27-gauge needle.

The entire injection process typically takes about 60 seconds.
Injection Technique: INJECTION
Injection Technique:

INJECTION

Non-Operative Management with Collagenase

Inject .25 CC's for MP and .20 CC's for PIP each containing with 0.58mg of Collagenase

1/3 of dose in three separate places in the cord (not through the cord)!!
Dupuytren’s Disease
Two For One Injections:

Manipulation Technique:
Not a Simple Pull on the Finger!
**Manipulation Technique:**
Put the forearm in pronation, wrist in palmer flexion and keep uninvolved joints flexed!

**Injection Technique and Cord Rupture**
**Dupuytren’s Disease**

**Problems to Avoid: Flexor Tendon Injuries**

*In patients with MP contractures*
- Skin to Flexor tendon sheath distance = 7.4 +/- 3.9mm (range 4-16mm)

*In patients with PIP contractures*
- Skin to Flexor tendon sheath distance = 4.7 +/- 1.6mm (range 3-7mm)

*Currently not FDA approved*

---

**Dupuytren’s Disease**

**Problems to Avoid: Flexor Tendon Injuries**

- When injecting the cord contracting the 5th finger PIP
  - Do not inject more than 4 mm distal to the first palmer digital crease
  - Whenever possible, inject as far away from the PIP proximally as possible

*NEVER INJECT IN THE RED ZONE ON THE 5th FINGER*
Dupuytren’s Disease

Problems to Avoid: Flexor Tendon Injuries

- Needle insertion into the cord contracting the 5th finger PIP should never be more than 2 mm to 3 mm in depth
  - As a reference, the bevel on the 27-gauge needle is ~1.25 mm

Problems to Avoid: Nerve Injuries

Note: Cord Actually Straight and the Neurovascular bundle spirals!
**Dupuytren’s Disease**

**Problems to Avoid:** Nerve Injuries

- 18-gauge needle
- 25-gauge needle
- 27-gauge needle

**Summary of Safety**

- Flexor tendon injuries occurred in 5th finger during treatment for PIP contractures (3/2700)
- No Digital Nerve Injuries
- Overall across all studies 2,600 injections have been given to over 1000 patients with an occurrence rate of < 0.2%
- No serious or systemic immunologic adverse events have occurred
- There were no significant clinical changes on clinical laboratory tests, vital signs or overall patient assessment
Original Article
The New England Journal of Medicine
Injectable Collagenase Clostridium Histolyticum for Dupuytren's Contracture
Lawrence C. Hurst, M.D., Marie A. Badalamente, Ph.D.,
Vincent R. Hentz, M.D., Robert N. Hotchkiss, M.D.,
F. Thomas D. Kaplan, M.D., Roy A. Meals, M.D.,
Theodore M. Smith, Ph.D., and John Rodzvilla, M.D.,
for the CORD I Study Group*
Enzymatic Fasciectomy Cases and Outcomes
Samantha Muhlrad, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Describe cases of collagenase injections and outcomes.
- Describe expected and change in contracture and range of motion following injection.

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Dr. Samantha Muhlrad, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
Enzymatic Fasciotomy Cases and Outcomes

SAMANTHA MUHLRAD-KARP, MD
HAND FELLOW
SUNY STONY BROOK
DEPARTMENT OF ORTHOPAEDIC SURGERY

A Review of the CORD I Study Group
Injectable Collagenase Clostridium Histolyticum for Dupuytren’s Contracture

Lawrence C. Hurst, M.D., Marie A. Badalamente, Ph.D., Vincent R. Hentz, M.D., Robert N. Hotchkiss, M.D., F. Thomas D. Kaplan, M.D., Roy A. Meals, M.D., Theodore M. Smith, Ph.D., and John Rodzvilla, M.D., for the CORD I Study Group

New England Journal of Medicine
September 3, 2009
Prospective, randomized, double-blind, placebo-controlled, multi-center trial

Level I evidence

- Between September and December 2007
  - 352 patients screened
  - 308 patients were enrolled
  - 204 joints received collagenase
  - 104 joints received placebo
• **PRIMARY END POINT:**
  - Reduction in primary contracture to 0-5 degrees of full extension 30 days after last injection
  - 26 secondary end points

• Baseline characteristics of the patients were similar between the two groups except for sex.
Analysis excluded two primary joints that were injected:
- One joint in the placebo group
- One joint in the collagenase group had a baseline contracture of 0 degrees before treatment

**Efficacy**

**END POINT:** Contractures reduced to 0-5 degrees of full extension 30 days after the last injection

- 64% of all joints injected with collagenase.
- 6.8% of joints injected with placebo
Median time to reach the primary end point for collagenase treated joints was 56 days.

At the 90 day visit, there was no recurrence of contracture in any collagenase treated primary joint that had reached the primary end point.
Mean change in contracture from baseline -- 30 days post injection

- 50.2 → 12.2 degrees in collagenase group
- 49.1 → 45.7 degrees in placebo group

More collagenase injected patients reached the primary end point 30 days after the first injection

38.9% vs 1.0%, p<0.001
Clinical Improvement

**Clinical improvement** was defined as reduction in contracture of 50% or more from baseline.

- Significantly more collagenase-injected joints showed clinical improvement 30 days after the last injection.
  - 84.7% of collagenase group
  - (94% of MCP, 67.1% of PIP)
  - Vs
  - 11.7% of placebo group
  - (11.6% of MCP, 11.8% of PIP)
## Adverse Effects (to be discussed further in upcoming talk)

- 741 injections total in 308 patients
  - 444 collagenase
  - 297 placebo

- 96.6% of the patients receiving collagenase reported at least one adverse event
- 21.2% of the placebo injected patients reported at least one adverse event

## Adverse Events

- Most were mild-moderate and resolved without intervention within a median of 10 days
Adverse Events

- Contusion
- Injection site hemorrhage
- Injection site pain
- Pain in the upper extremity
- Tenderness
- Ecchymosis
- Injection site swelling
- pruritus
- Skin laceration
- Lymph node enlargement
- lymphadenopathy
- erythema
- Blister
- Injection-site pruritis
- Axillary pain

“Serious adverse events” by report
- 20 patients in the collagenase group
- 2 patients in the placebo group

“Serious adverse event” deemed to be treatment related in collagenase group
- 1 case of CRPS (Complex Regional Pain Syndrome)
- 2 tendon ruptures
- No deaths
- No nerve injuries
- No clinically meaningful systemic allergic reactions
- No clinically meaningful changes in grip strength

Clinical Cases

Photos courtesy of Dr. Badalmente
Patient #1

Surgical recurrence - presented in 2003 with this

Same patient after 2 collagenase injections
2009 -- collagenase recurrence- underwent surgical fasciectomy with skin grafting

Same patient- right (contralateral) hand-2009- wants injection
Patient #2

Patient had only 1 injection with a great improvement in joint contracture,

MP joint contracture from 35° to 0 degrees at 90 day follow up
(Received 1 injection)
Patient #3

Left ring MP contracture was 55 degrees--\(\rightarrow\) 0 degrees after receiving 2 injections.

Left ring MP contracture was 55 degrees--\(\rightarrow\) 0 degrees at 90 day follow up (Received 2 injections)
- Patient #4

MP contracture 75 degrees, PIP 55 degrees $\rightarrow$ 0 degrees at 90 day follow up

- Patient received 3 injections

MP contracture 75 degrees, PIP 55 degrees $\rightarrow$ 0 degrees at 90 day follow up
(Received 3 injections)
Patient follow up on the internet

http://www.youtube.com/watch?v=BQ-ak4R72yk&feature=related

Woman documents every step of her collagenase injections, manipulations, recovery and final outcome…

Check it out

References:


- Photographs courtesy of Marie Badalamente, Ph D and Katherine Euler, RN.
Dupuytren’s Disease Symposium

Collagenase Complications
F. Thomas Kaplan, M.D.

Educational Objectives

Upon completion, participants should be able to:

- Identify and become familiar with potential risks involving use of collagenase and provide means to mitigate these risks.

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Speaker’s Bureau: Auxilium Pharmaceuticals
Complications of Injectable Collagenase

F. Thomas D. Kaplan, M.D.

Indiana Hand to Shoulder Center
Indianapolis, Indiana

Disclosures

• Served as speaker for Auxilium

• Received research funding from Auxilium
Clinical Experience
(prior to commercial release)

- 11 Clinical Studies
- 1082 patients
- 2630 injections
  - 1036 MP cords
  - 743 PIP cords
- 87.6% completed Rx
- 3% withdrew consent
- 4.9% lost to follow-up
- 1% due to AEs
- Mean follow-up (from 1st)
  - 9.5 months
  - Minimum = 2 days
  - Max = 6.7 years

From FDA Briefing Document and Sponsor Presentation to the Arthritis Advisory Committee Sept. 16, 2009

Patient Exposure (n=1082)
Common Side Effects

- Local / Regional Swelling
- Tenderness
- Ecchymosis
- Pruritis
- Skin Tear

Confined to treated arm
Mild to moderate intensity
Resolve w/out intervention
Mean duration 10 days
Adverse Reactions Occurring in ≥ 5% of collagenase-treated Patients and at a Greater Incidence than Placebo in the Placebo-Controlled Trials Through Day 90 After Up to 3 Injections

<table>
<thead>
<tr>
<th>Adverse Reactiona</th>
<th>Collagenase (n=249)</th>
<th>Placebo (n=125)</th>
<th>All Studies (n=1082)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All adverse reactionsa</td>
<td>98%</td>
<td>51%</td>
<td>77%</td>
</tr>
<tr>
<td>Edema peripheralb</td>
<td>73%</td>
<td>5%</td>
<td>77%</td>
</tr>
<tr>
<td>Contusionc</td>
<td>70%</td>
<td>3%</td>
<td>55%</td>
</tr>
<tr>
<td>Injection site hemorrhage</td>
<td>38%</td>
<td>3%</td>
<td>35%</td>
</tr>
<tr>
<td>Injection site reactiond</td>
<td>35%</td>
<td>6%</td>
<td>41%</td>
</tr>
<tr>
<td>Pain in extremity</td>
<td>35%</td>
<td>4%</td>
<td>37%</td>
</tr>
<tr>
<td>Tenderness</td>
<td>24%</td>
<td>0%</td>
<td>29%</td>
</tr>
<tr>
<td>Injection site swellinge</td>
<td>24%</td>
<td>6%</td>
<td>25%</td>
</tr>
<tr>
<td>Pruritusf</td>
<td>15%</td>
<td>1%</td>
<td>18%</td>
</tr>
<tr>
<td>Lymphadenopathyg</td>
<td>13%</td>
<td>0%</td>
<td>11%</td>
</tr>
<tr>
<td>Skin laceration</td>
<td>9%</td>
<td>0%</td>
<td>12%</td>
</tr>
<tr>
<td>Lymph node pain</td>
<td>8%</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>Erythema</td>
<td>6%</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>Axillary pain</td>
<td>6%</td>
<td>0%</td>
<td>7%</td>
</tr>
</tbody>
</table>

* Occurring in ≥5% of patients.

b Most of these events were swelling of the injected hand.
c Includes the terms: contusion (any body system) and ecchymosis.
d Includes the terms: injection site reaction, injection site erythema, injection site inflammation, injection site irritation, injection site pain, and injection site warmth.
e Includes the terms: injection site swelling and injection site edema.
f Includes the terms: pruritus and injection site pruritus.
g Includes the terms: lymphadenopathy and axillary mass.


Related to Mechanism of Action: Collagen Fragments

- Contusion / Ecchymosis
- Local and Regional swelling
- Injection site tenderness / pain / erythema
- Lymphadenopathy / node pain
Pathophysiology

- Collagen fragments pharmacologically active
  - Vascular leakage
    - Onset 5 – 15 min
    - Edema
    - Hemorrhage
  - Inflammation

- Vascular leakage
  - Increased permeability
  - Vasodilation

- Bradykinin-like activity
- Mast cell degranulation
Pathophysiology

• Inflammation
  • Inflammatory cell chemotaxis
    • Neutrophil (day 1-7)
    • Monocyte (> 7 days)

Figure 1 from Laskin DL et al (1986), J Leukocyte Biol 39: 255-266. Neutrophil chemotaxis was evaluated in response to exposure to peptides generated by clostridial collagenase (•) or cyanogen bromide (○) mediated degradation of Type I collagen. Chemotactic activity of a bacterial peptide (fMLP) (△) is shown for comparison. There is no response to non-collagen peptides (trypsin digest of albumin, †).

Pathophysiology

• Clearance of fragments
  • Non-specific proteases
    • Act on cleaved collagen
    • Further degrade fragments
  • Macrophage phagocytosis
    • Remove fragments
Treatment of Common Side Effects

- Mean duration = 10d
- Self-limiting
  - Elevation
  - Compression
  - Ice
  - Wound care
  - Analgesics
  - Antihistamines

Other Minor Adverse Events

- Skin tear
- Allergic reaction
- Failure to lyse cord
Skin Tears

• Risks
  • Skin adherent at inj site
  • Intradermal blistering
  • Excessive extension

• Treatment
  • Non-adherent dsg
  • Allow to wash w/ mild soapy water
  • Heal via 2°intention
Allergic Reactions

- Minor (15%)
  - Hives
  - Rashes
  - Pruritis
    - Incidence ↑ with # inj

- Severe
  - anaphylaxis

**Exploratory Analysis of “Pruritus” AEs by Injection #**

<table>
<thead>
<tr>
<th></th>
<th>Study 57 (U.S.)</th>
<th>Study 59 (Australian)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Xiaflex n=203</td>
<td>Placebo n=103</td>
</tr>
<tr>
<td>After up to 3 injections</td>
<td>33/203 (16%)</td>
<td>1/103 (1%)</td>
</tr>
<tr>
<td>After 1 injection</td>
<td>10/203 (5%)</td>
<td>1/103 (1%)</td>
</tr>
<tr>
<td>After 2 injections</td>
<td>15/99 (15%)</td>
<td>0/100 (0%)</td>
</tr>
<tr>
<td>After 3 injections</td>
<td>20/45 (44%)</td>
<td>0/91 (0%)</td>
</tr>
</tbody>
</table>

1 Pruritus AEs included Pruritus, Injection Site Pruritus, & Pruritus Generalized

From FDA Presentation to the Arthritis Advisory Committee
Sept. 16, 2009

Antibody Response

- Clostridial collagenase is a mixture of two enzyme subtypes

- 30 days after 1st injection
  - 92% pts have Ab to AUX-1
  - 86% pts have Ab to AUX-2

- After 4th injection
  - All patients have Ab to both AUX-1 and AUX-2

From Sponsor Presentation to the Arthritis Advisory Committee
Sept. 16, 2009
Treatment for Allergic Reaction

- **Mild**
  - Observation
  - Diphenhydramine 25-50 mg/Kg

- **Severe**
  - A, B, C and LOC
  - Epinephrine injection
    - 0.2 – 0.5mg SQ/IM q5 min prn
  - IV with NS 5-10 ml/Kg in 1st 5 minutes
  - Diphenhydramine 25-50 mg q2-4 hr prn
  - Consider transport to ER

From Lieberman et al. 2005: Diagnosis and Management of anaphylaxis: An updated practice primer

Rash

- **Symptoms**
  - Itching
  - Tenderness

- **Rx**
  - Observation
  - Anti-histamine
  - Lotion
Failure to Lyse Cord

- Avg inj / cord = 1.7
- Patient discomfort
  - Pre-manipulation anesthetic
- Thick cord
  - Transverse injection

Serious Complications

- Safety Database
  - 1082 patients
  - 1780 cords
  - 2630 collagenase inj
  - Mean f/u 9.5 months
  - Longest f/u 6.7 yrs
  - 11 serious adverse events related to injection

- Related to MOA
  - Tendon rupture (3)
  - Tendonitis (1)
  - Pulley rupture (1)

- Unrelated to MOA
  - CRPS (1)
  - Sensory abnormality (1)
  - Ligament disorder (1)
  - Fracture / ligament (1)
  - Boutonniere deformity (1)
  - Elective amputation (1)
Tendon Rupture

• All occurred w/in 8 days of injection

Tendon Ruptures

• All in Rx of small finger PIP cord

• Tendons involved
  • FDS & FDP (2)
  • FDP & partial FDS (1)
Collateral Damage

- Clostridial collagensase active on Types I/III collagen
- Extravasation may lead to tendon, pulley, or ligament damage
- Site of injection must be in area of maximal separation of cord and flexor theca

Treatment

- Observation
  - If isolated FDS or FDP
- Excision and tenolysis
  - Isolated FDS or FDP
- Excision and tendon grafting
**Pulley Rupture**

- A2 & A4 pulley rupture
  - Small finger PIP inj

- Risks
  - Proximity to injection

- Rx
  - Pulley reconstruction
  - PIP joint fusion

**Tendonitis**

- Injection given to middle PIP

- 14 days post injection – loss of DIP motion

- MRI
  - Hypertrophic tendonitis / partial tear

- Outcome unknown
Sensory Disturbance

- 1 yr post injection
  - Pt developed paresthesias associated with thickened cord
  - Resolved following STPF
- No reported nerve injuries following injection or manipulation

Complex Regional Pain Syndrome

- Patient with h/o CRPS following DR fx
- Day 14 – persistent swelling & dx CRPS
- Rx
  - Oral steroids
  - Pregabalin
  - Hand therapy
Others

- Ligament disorder
  - Chronic sagittal band rupture unmasked
- Boutonniere deformity
  - Chronic central slip attenuation unmasked
- Fracture & ligament injury
  - Occurred from crush injury 14d s/p inj
- Elective amputation
  - MP joint treated (30° to 20°)
  - Underlying PIP 100°
  - Had laceration w/exposed flexors
  - Pt choose amp over flap coverage

Thank You
Dupuytren’s Disease Symposium

Hand Therapy in Dupuytren’s Disease
Evren Ludin, MS, OTR/L, CHT

Educational Objectives

Upon completion, participants should be able to:

- Identify the target population.
- Identify a post-operative treatment program as per SBUMC Hand Rehabilitation Center.
- Review static and dynamic splinting options to regain full extension and flexion.
- Identify possible complications.

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Evren Ludin, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
CARDINAL RULE OF THERAPY:

Always instill a sense of trust and compassion in your patients when greeting them, as their first session will most likely be the first time they get to see their hand after surgery.
“Welcome to hand therapy: together we’ll identify a treatment program to optimize your recovery, but have no worries because **YOUR PAIN is OUR PLEASURE**! “

**Objectives:**

- Identify the target population

- Identify a post-operative treatment program as per SBUMC Hand Rehabilitation Center

- Review static and dynamic splinting options to regain full extension and flexion

- Identify possible complications

- Case study
Although rehabilitation has not been found to be effective in pre-operative management of Dupuytren’s, it plays a crucial role in post-operative care (1). In 1985, J. Gosset indicated that 50% of the post-operative result relies on rehabilitation (6,11), a belief that is still embraced today (5,6,10,12).

- The typical patients are male, 50-60 years of age, and of northern European heritage. Atypical, but existent, are females over 60 years of age. Commonly bilateral, with one hand more affected than the other. (6)

- They present to the clinic with c/o pre and post-operative functional deficits which include: personal hygiene, difficulty grasping objects, shaking hands, donning gloves, placing hands in pockets etc....

SBUMC Hand Rehabilitation Center

The patients will often have a pre-arranged appointment for therapy immediately before or after their post-op Surgeons appointment.
(2-4 days post-op)
Post-operative Management:

The post-operative course of management for Dupuytren’s Disease is focused on regaining intra-operative finger extension, maximizing full finger flexion, minimizing the edema, scar tissue control, and regaining strength (6). Ultimately, the goal is for the patients to return to their pre-morbid functional task performance in all aspects of their activities of daily lives. (work, play or leisure).

Prior to the evaluation, good communication with the surgeon is imperative when setting goals and expectations, so that the therapist and patient are aware of intra-operative results.
Hand Rehabilitation for Dupuytren’s Disease is largely guided by the phases of wound healing: (6,8,11)

• **I = Inflammatory Phase, 0-2 weeks** – vascular dilation with edema; neutralization by the release of proteolytic and collagenolytic enzymes; phagocytosis of debris or bacteria.

• **II = Proliferative Phase, 2-6 weeks** – fibroblastic proliferation; new capillary growth; collagen formation and epithelialization.

• **III = Maturation Phase, 6-52+ weeks** – decreased fibroblastic activity and collagen production; increased tensile strength as it matures and then softens.

**PHASE I: Inflammatory Phase, 0-2 weeks**

*Presentation & Tx:*

• Prepare the patient for surgical sight / Z-plasty / debulk 2-4 days post-op.
• Assess edema, ROM and splinting.
• DASH and history.
• Wound closure / dehiscence / drainage / dressing options.
• Patient education / progression through rehabilitation.
• Therapy 2-3 x per week.
• HEP, night splint, & home dressing changes – all with demo and return demo and handouts.
• Sutures are removed at 10-14 days, at times by therapist.

*Goals:*

• Control edema / elevation / minimal compression.
• Regain / maintain intra-operative digital extension.
• Limit digital flexion contractures / ROM / differential gliding.
• Home exercise compliance independence.
**Night extension splint:**
* Splints are modified to accommodate edema & scar conformers for night scar pressure. Alternate designs include forearm based splints and dorsal hand based splints, dependent on the therapist's preference.

**Wearing Schedule for extension splint:**
* We encourage full night time splinting and intermittent day wear for 30 minutes 3 x / day to ensure full digital extension, initially. At 3-6 weeks post-operatively, they may wean to night wear only, as appropriate.

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**PHASE II: Proliferative Phase, 2-6 weeks**

**Presentation & Tx:**
- Increased edema & thickening scar / introduce conformers & compression sleeves upon wound closure.
- Therapy 2-3 x per week / modalities PRN.
- Remold splints and add dynamic splints as necessary by 2-3 weeks, wean to night splinting only by 3-6 weeks.
- Improved AROM, risk of PIP contracture by 4-6 weeks, difficulty with hook fist.
- PRE’s introduces at 4-6 weeks post-op.

**Goals:**
- Maximize AROM and PROM / differential gliding.
- Minimize scar adhesions & control scar remodeling.
- Sensory re-education / desensitization & toothbrush HEP.
- Pre-morbid ADL performance.
- HEP independence
Timely initiation of deep friction massage, soft tissue mobilization, and pressure are imperative to shaping a supple scar and optimizing ROM.

PHASE III: Maturation Phase, 6-52+ weeks

**Presentation & Tx:**
- Therapy usually continues until 6-10 weeks post-op
- Persistent edema, scarring and stiffness may present
- Remold splint and dynamic splints as necessary
- Encourage HEP of continued edema and scar control

**Goals:**
- Refine sensory re-education
- Maximize ROM
- Regain full functional use of their hands
- HEP independence
- Discharge planning
**Splinting options to maximize joint mobility and encourage differential tendon gliding:**

- (A) blocking splint doubles as a dynamic IP flexion splint
- (B) Dynamic MCP flexion splint

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**More splinting options:**

- (A) dynamic PIP extension splint.
- (B) static progressive PIP extension splint.
More splinting options:

golf glove, latex glove fingers, and buddy taping.

Delaying Therapy for Grafts:

• When a skin graft is used for wound coverage, ROM is delayed and no compressive garments are to be used until 10 days post-op or until MD orders are received. This will ensure good vascular perfusion on newly healing grafts. Dermofasciectomy and skin grafting had been advised as a technique to be used since 1952 (15), but is rarely used in our practice today.
**Potential Complications (5,12):**

- Wound dehiscence
- Excessive exudate and infection
- Hematoma
- Joint contracture of PIP (flexion), and rarely of MCP (extension)
- Webspace or intrinsic tightening
- RSD / CRPS
- Non-compliance
- Recurrence or Dupuytren’s Flare

**Case Study: Mr D.**

- 68 y/o left hand dominant male, College Professor.
- Reported 6 year progression, familial history, and no other significant medical history.
- Pre-operative PIP contracture of 60 degrees and MCP contracture of 45 at IV.
- 2 days post-op fasciectomy of IV and DPC of V. TAM ~ IV 160 degrees & V 155 degrees, minimal serous drainage, and 2+ edema. TAM II & III were WNL.
- Initial DASH score of 28.3%.
- 4-6/10 pain, dull / throbbing, frequent (75-100% of the time) in IV & hand, intact 2 point static and dynamic R/U aspects
- Patient goals: “to pick up grandchildren easily, play the piano, & play golf”.
- Tx for 2 x per week for 8 weeks.
Tx & Desensitization Program:

Tx & HEP initially included AROM, PROM, 1 week of dressing changes, intrinsic stretches, tendon gliding, STM, and splinting. Upon suture removal, heat, DFM, blocking splints, desensitization, sensory re-education, and PRE’s were added.

Mr D. was instructed to buy an inexpensive power toothbrush for desensitization, in addition to the multi-medium program.

*Blocking splints like these were used to optimize gliding of the FDS and FDP.*
Good differential glide and intrinsic glide:

*Pre-operative PIP contracture of 60 degrees and MCP contracture of 45 degrees were corrected.

*Post-operatively to -5 degrees at the PIP and 0 degrees at MCP. IV TAM = 240 degrees, V TAM=240 degrees

*Full web space spread was achieved, intact digital sensation with numbness along scar, 2/10 pain intermittent (0-25% of the time).

* Good strength 70# R vs 59# L.

**"Returned to piano, golf, and picking up grandchildren without jabbing them in the armpit”. DASH = 8.3% and discharge at 7 weeks post-operatively.**
References and suggested readings:


Thank You!
Educational Objectives

Upon completion, participants should be able to:

- Describe the purpose of a national medical quality register.

Disclosure Statement

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Dr. Stephen Wilbrand, the meeting planners and the CME provider have no significant financial interest or other relationship with the provider of commercial products or services discussed in the educational activity or that have directly supported the CME activity through an educational grant.
Registries in Dupuytren’s Disease

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There are no proper registries for Dupuytren’s disease...
Some large cohorts

1985, International epidemiological study by McFarlane, (812 patients)

2001, Epidemiological study in North Germany Brenner, (566 patients)

2005, Epidemiological study in Uppsala/Sweden Wilbrand, (16 517 patients)

2007, Retrospective analysis of 2 919 operated hands from Erlangen / Germany Loos, (2 919 patients)

The tax financed national health care system and the personal identity number
The personal identity number is the Swedish national identification number, introduced in 1947, and was probably the first of its kind covering the total resident population of a country.

The "personnummer" is issued by the Swedish Tax Agency as part of the population register.

The "personnummer" is used by authorities, by health care, schools, universities, banks and insurance companies.

The personal identity number consists of 10 digits and a hyphen.

540912-1430
YYMMDD

Checksum

odd 9th number = male,
even 9th number = female

Serial numbers
In 1965, the Swedish national Board of Health and Welfare began collecting data on individual hospital discharges in the **Inpatient Register**. (Encoded according to ICD-codes) (diagnosis and procedures).

The Inpatient Register is population based and referable to the population of the counties covered by the registration.

1987 collecting data (ICD-codes) even from outpatients, **Outpatient Register**.

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**National Quality Registries**

A system of national quality registries has been established in the Swedish health and medical services in the last decades. There are about 70 registries and four competence centres that receive central funding in Sweden.

**Definition:**

A national quality registry contains individualised data concerning patient problems, medical interventions and outcomes after treatment; within all healthcare production. It is annually monitored and approved for financial support by an Executive Committee.
Vision:

The vision for the quality registries and competence centres is to constitute an over-all knowledge system that is actively used on all levels for continuous learning, quality improvement and management of all healthcare services.

Medical Quality Registries
(with English websites)

Hip:
http://www.jru.orthop.gu.se

Knee:
http://www.ort.lu.se/knee

Heart:
http://www.ucr.uu.se/rikssvikt

Stroke:
http://www.riks-stroke.org

and many many more...
HAKIR, Hand Surgical Quality Register

HAKIR started this year after an initiative from the Swedish Society for Surgery of the Hand.

All 7 Hand Surgical Departments at the seven University Hospitals are participating as well as private Hand Clinic’s.

Purpose:

Continuous standardised follow-up of the quality of the Hand surgical care and the patients own opinion of the care given.

Compare results between alternative treatment options and between different Hand Surgical Centres, with the purpose to gradually improve and make the medical care more efficient.

To register all postoperative complications in order to improve the patient’s safety.
Structure HAKIR

- Basic registration
- Extended registration

Basic registration

- Diagnosis
- Type of operation /procedure
- Possible antibiotic prophylaxis
- Patients Questionnaire,
  3 and 12 months postoperative,
  (Quick DASH)
Patient’s ID

Left/right date of operation

Primary op

Re-operation due to:
- infection
- skin necrosis
- haematoma
- nervocompression
- tendon rupture
- nerve injury
- pseudarthrosis
- contracture
- prosthesis problem
- other

Diagnose code ICD 10

Operation code

Patient’s questionnaire (pre-op)

Quick DASH

VAS-scale
Part 2 Patient's questionnaire (pre-op)

Quick DASH

ADL-activities

Patient's questionnaire (post-op)

3 and 12 months post-op, optional 24 and 36 months post-op.

Quick DASH

VAS -scale
Extended registration (10 diagnosis)

- Dupuytren’s Disease
- Flexor tendon injury
- Extensor tendon injury
- Nerve injury (Median, Ulnar, Radial)
- Arthritis of the Thumb basal joint
- Prosthesis surgery (wrist, DRU, MCP, PIP)
- Scaphoid surgery
- Inter-carpal fusions
- Wrist fractures
- TFCC-injuries

Pre-op evaluation

Finger goniometry

- Thumb
- Index finger
- Middle finger
- Ring finger
- Little finger

Grip strength

Lateral pinch grip strength
Op registration

Digit 1, 2, 3, 4, 5

Primary or recurrent disease

Type of operation: (fasciotomy, fasiectomy or enzymatic)

Skin procedure: (Z-plasty, Y-V-plasty, skin-graft, skin-flap)

Joint-surgery: capsulotomy, arthrodesis, amputation

Follow up registration

3, 12 and optional 24 or 36 months post-op

Finger goniometry

Strength

Post op treatment:
(dynamic splint, static splint)

Complications:
(infection, skin necrosis, nerve injury, arterial injury)
Possible results

Subjective patient's satisfaction compared with objective measured data (ROM, strength) in different operative methods

Differences in results after surgery depending on method

Differences in frequency or type of postoperative complications

Differences in postoperative results in men and in women. Should you use the same method for both genders?
I hope we will be able to give you more interesting data on Dupuytren’s disease when our National Hand Surgical Quality Register has been running for some years…
Educational Objectives

Upon completion, participants should be able to:

- Identify aware of some unusual presentations of Dupuytren’s and risks for early reoccurrence after treatment.
- Discuss management of unusual presentations of Dupuytren’s and risks for early reoccurrence after treatment.

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*Auxilium Pharmaceuticals: Research Support, Honorarium Recipient*
Complex cases
Surgical/Nonsurgical

Philip Blazar

4/17/2010

Disclosures

• 1) Auxilium Pharmaceuticals Research Funding
CD
One major collagenase worry

- 72 Y Retired Female with bilat small finger PIP contractures
- 2006 L FFC of 10 at MP and 45 at PIP (progressed over a few months)
- ADM cord
- 3/2006 subtotal fasciectomy L small.

CD

- PMH:
  - PULMONARY NODULES / LESIONS - MULT
  - COLONIC POLYP
  - DIVERTICULOSIS
  - DEPRESSIVE DISORDER
  - HYPERTENSION - ESSENTIAL
  - GASTRIC ULCER: history of
  - GASTROINTESTINAL BLEEDING
  - POSITIVE PPD

- Meds
  - Vit D
  - Omeprazole 20mg qDaily
  - Citalopram 40mg qDaily
  - Plaquenil 200mg qD
  - Ativan 1mg qHS PRN
  - Zocor 10mg qHS
  - Fosamax 35mg qWeek
  - Vit D
  - MVI
  - Calcium

- NKDA
  - 35+ pack*yr smoker
CD R hand

- 11/07 Xiaflex x 2 for R small PIP FFC of 45
- ADM cord
- Correction to FFC 15 with nodularity but not an obvious cord present

R 2.5 yrs post injection
At 2.5 yrs post injection further Rx was indicated.
- She elected subtotal fascietomy after reviewing the options.
Fasciectomy after injection
Fasciectomy after injection

Fasciectomy after injection
Observations

1) No “bomb had gone off”
2) Markedly thinned cord in one area; new or old tissue?
3) Tactile properties of the tissues; much less adherent
4) Abnormal tissue planes were still understandable
JM: Unusual cause of early “recurrence”

- 76 Y Retired Female with bilat small finger contractures
- R small MP FFC of 90.

- PMH: HTN, Cholesterol, Hypothyroid, Osteopenia, Carotid stenosis, GERD
- Meds: Simvistatin, Spirolactone, Levoxyl, Metoprolol, ASA, CA, Vit D, Lipitor
- FH: + Father
  - Both parents British Isles

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JM: Unusual cause of early “recurrence”

- 76 Y Retired Female with bilat small finger contractures
- **12/07 Xiaflex x 3**
- **Correction to FFC of 20 passively but lacked active extension**

- PMH: HTN, Cholesterol, Hypothyroid, Osteopenia, Carotid stenosis, GERD
- Meds: Simvistatin, Spirolactone, Levoxyl, Metoprolol, ASA, CA, Vit D, Lipitor
- FH: + Father
  - Both parents British Isles
Sagital band deficiency

- Refused surgery
- 2 yr. follow up
- R FFC of 65 (20)

Extensor Deficiency at MP

- Hueston Ann Chir Main 1985
- Secondary deformity, analogous to DIP ext and PIP Flexion,
- ADM
- May require Relocation of Exts
JJ:
S/p revision DermatoFasciectomy, FTSG and sagittal band realignment
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Auxilium Pharmaceuticals

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