SUMMARY: Of the 450 cases seen in my practice (1946-76), 50 cases were rejected for any kind of treatment for various reasons. In an additional 50 cases, fasciotomy was done at a V.A. facility. This procedure was abandoned in favor of bandectomy. Amputation of useless fingers (usually the acutely contracted small finger) was done in 5 cases at the patient's request to remove this occupational hazard. In the remaining 350 cases of primary fasciectomy, there were 2 cases of accidental severance of the digital nerves in the finger, which were repaired at once. These occurred before I began to use the zigzag incision which provides excellent exposure of the N.V. bundles ensuring their safety. With regard to skin slough, when Z-plasty was used early in this series, there was an occasional slough of the acutely angled tip of the transposed flap. After I began to use the zigzag volar incision, and doubtful skin edges were trimmed away, there was no skin necrosis. Antibiotics were used briefly in a few cases where there was intra-trigo with skin maceration at acutely flexed PIP joints. The incidence of seroma, hematoma and infection was zero.

KEY-WORD: Dupuytren's disease.

RÉSUMÉ: Cinquante des 450 cas examinés par l'auteur au cours d'une expérience personnelle de 30 ans (1946-1976), ne nécessitèrent aucun traitement. 50 sujets âgés subirent une simple fasciéc- tome, cette technique étant par la suite éliminée au profit d'une fasciéc-tomie limitée. Dans 5 cas, une amputation d'un doigt gênant (surtout en 5° flexion accentuée), fut pratiquée à la demande du patient, pour éviter un accident domestique. Parmi les 350 autres patients qui subirent tous une fasciéc-tomie, il n'y eut que 2 sections nerveuses accidentelles réparées immédiatement. L'emploi d'une incision en zigzag, qui donne une excellente exposition des pédicules vasculo-nerveux, permit d'éviter complètement cette complication. Cette incision permit aussi d'éviter la nécrose de la pointe du lambeau de plastie en Z. L'utilisation des antibiotiques a été réservée aux rares patients, porteurs d'un inter-trigo, avec macération cutanée, lors des flexions accentuées de l'IPP. La série de l'auteur ne comprend ni sérome, ni hématome, ni infection.

MOT-CLÉ: Maladie de Dupuytren.
In 1976 I retired from active practice, the first twenty years of which was in General Surgery. After working for three years in Army Hospitals (1943-46) under the direction of Dr. Sterling Bunnell, I returned to private practice in Des Moines, Iowa and for the next 30 years limited my practice to surgery of the hand. For the past ten years (1976-86) I have seen patients only for advice, consultation and referral.

Dupuytren's disease and its treatment has always been to me a fascinating subject, so much so that on a recent Caribbean holiday, I took along for pleasure reading several recent articles on this subject. These included papers by surgeons who have made a lifetime study of this condition: John Hueston of Melbourne, Australia, Raoul Tubiana of Paris and Robert McFarlane of London, Ontario, Canada. Also I re-read the papers given at the SICOT Symposium in Paris (1966) which were published in an admirable volume under the aegis of GEM.

It was my impression after reading this material that the treatment of Dupuytren's Contracture has not kept pace with other branches of hand surgery. Several factors are responsible for this, including the enigmatic cause of the condition, a subject now under active investigation. Among those factors over which we do have some control are the selection (or rejection) of operative cases and the technique of the operation.

There is an obvious lack of accepted criteria for operation and of a standard technique for fasciectomy. Due to conflicting ideas of surgeons experienced in this field, the young surgeon is confused as to the proper course to follow.

I decided while on holiday to record my own impressions of this subject while I was in active surgical practice; the methods and techniques which led to successful results. Here then, unburdened by statistics is an impressionist report based on 450 cases seen during the 30 years my active practice in hand surgery (1946-1976).

I realize that such an unorthodox report faces the hazards of doubt, disbelief or derision. I can only hope that my « senior status » will shield me from such slings and arrows.

The purpose of treatment in Dupuytren's Contracture is to give the patient a better hand. Such a commendable goal would seem obvious. But the road to success winds through a banyan jungle of hypertrophic fascial bands, often entwined with N.V. bundles (a machete is not called for here!).

Also, owing to unwise selection of cases for treatment in these aging hands, flexion contracture may be released, but in its place, after surgery, swelling and stiffness are present, with inability to make a tight fist.

### Selection (or Rejection) of Operative Cases

(Not all cases of D.C. should be operated upon!)

**Dupuytren's disease praecox**

In rare cases, hypertrophic fascia with contracture appears as early as age 25 to 30. The disease follows a headlong course with early disability. In such cases, the utmost conservatism is indicated. Any surgical trauma, however minor, may constitute an aggravated assault on the hand, making the last state worse than the first.

**Too early**

Some patients present with a heavy fascial band in the palm without contracture. These cases should return in 3-6 months for re-examination. At that time the surgeon can decide whether the pathology is static or progressive.

**Too late**

Very elderly, often retired patients, who are doing well, in spite of contracture. Individual consideration is given to general health, and to the patient's desire for treatment. Occasionally, amputation of a badly contracted finger at PIP joint level may be considered, but only at the patient's request. While such treatment may be useful in men, amputation should rarely be done in women.

**Bad health**

Severe diabetes, high blood pressure, heart conditions etc. may contra-indicate any treatment whatever, each case to be judged on its own merits.

**Bad psyche**

Some patients, otherwise ideal for surgery may be potential cases of « Reflex Sympathetic Dystrophy ». Be wary of the anxious, introverted, or depressed patient. All hand surgery is « traumatic », but in some patients it is doubly so, the operation precipitating changes in the sympathetic nervous system which are hard to reverse. These patients often have a « cold clammy » hand, and this should be a warning.

The opposite side of the coin is the florid faced « good time Charley », often an alcoholic. These patients generally have no trouble with wound healing. Reflex Sympathetic Dystrophy must not be used as an alibi for the surgeon who inflicts unnecessary surgical trauma on these aging hands, thus consigning them to the whims of the « unsympathetic » nervous system.

The ideal surgical case is a healthy, optimistic, middle-aged patient who comes in asking for the treatment of a contracture which is causing him actual disability. In my experience, men achieve better surgical results than women — who are more prone to develop stiffness.
THE OPERATION

I list the following procedures and adjuncts to surgery, used in the last ten years of my practice.

Anesthesia

Axillary block given by a trained anesthesiologist was standard in my practice for all major hand cases. It was often supplemented by IV sodium-pentothal sedation. Nerve block was used in minor cases.

Hemostasis

A bloodless field is essential for the rapid, accurate dissection necessary in fasciectomy. The pneumatic cuff is applied carefully to the upper arm and held in place by a roller bandage. A mercury monometer is preferable to the commonly supplied aneroid gauge which may not be reliable.

If excessive pressure (over 300 mmHg) is used, as for surgery on the leg, paralysis may occur. Litigation is not far away! (Senoř el medico-abrogado is waiting in the next room).

The arm should be elevated for 5 minutes while exerting firm pressure on the hand. Tourniquet pressure is applied instantly (between heart beats). I did not exsanguinate the hand by Esmark bandage, prior to application of the pressure. Enough blood must remain in the blood vessel so that they are readily seen, identified and protected from injury.

Tourniquet time

Active dissection (fasciectomy) can often be completed in 30-45 minutes with a limit of 60 minutes. The arm is then elevated, tourniquet pressure released, and the hand gently compressed for five minutes. If proper technique has been used, there should be little or no active bleeding. The operation is then completed without reaplication of pressure.

Tourniquet pressure

Tourniquet pressure must be carefully monitored during operation. A falling pressure (between systolic and diastolic) leads to passive congestion with a blue hand and a further fall leads to active bleeding with a flushed hand. Pressure over 300 mmHg must never be used despite the failure to achieve a bloodless field. The cuff should simply be removed and carefully reapplied. « Detour bleeding » through the narrow cavity of the humerus may be the cause of the difficulty.

Tissue reaction

Tissue reaction (as a result of ischemia) is still controversial. To be on the safe side, tourniquet time must be minimal, requiring pre-operative planning. Much experimental work has shown that tissue reaction from anoxia is definitely increased by heat. Cold saline must be used for irrigating the wounds and operating room light must also be cold.

Magnification

Magnification for dissection is essential. Good vision in a young surgeon is not enough. A 2-3 power loupe is best. Any higher magnification reduces the depth of focus and slows down the operation. This is not microsurgery.

Instrumentation

Instruments used for hand surgery include fine skin hooks, smooth button hooks for N.V. bundles, fine dissecting scissors (curved and straight), fine straight hemostats, Adson tissue forceps, and # 10 and # 15 scalpel blades. Stille instruments are best.

Incisions

The traditional incision for fasciectomy was a transverse incision in the distal palm, with undermining of proximal and distal flaps. Sometimes an auxiliary incision was made in the thenar crease, and the strap of skin thus created was lifted up like a suitcase handle. This gave grudging exposure of the palmar fascia and none at all to more distal fascia. At that time, crease incisions were « de rigueur ».

An alternative was to follow the distal palmar crease, then turn proximally, parallel to the ulnar border of the hand. Such a boomerang-shaped incision gave better exposure of the palm, but at the bend, an area where skin vascularity is often poor, sloughs of the edge of the flap were not uncommon.

Some surgeons attempted ablation of all palmar fascia including the vertical septa between flexor tendons, through a transverse incision in the distal palm. The results were sanguinary and counter-productive. An auxiliary Z-plasty in the proximal finger segment gave frustrating and unsatisfactory exposure of fascia at the MP and PIP joints.

I believe that the transverse distal palmar incision is obsolete for palmar fasciectomy. It is like digging a trench on Broadway for a sewer on 42nd Street. Mayor Koch would not approve such a project!

Tord Skoog, a Swedish plastic surgeon, who had worked with McIndoe during World War II, was the first to notice that fascia deep to the transverse palmar ligament (often an incomplete fascia) did not participate in hypertrophic changes. This concept led him to a conservative fasciectomy in the palm, where only the superficial longitudinal bands actually causing contracture were removed. A more radical fasciectomy was done in the finger.

I visited Dr. Skoog in Uppsala, on two occasions and was very much impressed with his technique and his results. Here was a method which was making these aging hands better, without undue morbidity. Skoog used straight longitudinal incisions in the palm — directly over the palmar band.

The zigzag palmar digital incision came to me in 1965 as a gift from an amateur bartender, who sustained zigzag glass cuts on the long and ring fingers of his right hand with severance of flexor tendons in
both fingers. I did a primary flexor tendon repair through these readymade lacerations, and marvelled at the superb exposure, and the facility for repair they provided. I reported this technique at the Lausanne-Vienna meeting in 1967.

Skin flaps

Although the zigzag palmar digital incision was first used for flexor tendon repair, I found it equally useful in fasciectomy for Dupuytren’s Contracture. The incision starts on the finger pad in the distal finger segment, and may proceed proximally to the heel of the hand. The “hinges” of the incision should be exactly at the level of the IP and MP joints and their palmar skin creases and not elsewhere. It should not stagger widely and should not expose the N.V. bundles. It should not have transverse component at flexion creases, because this creates flaps with acute angles. The obtusely angled flaps of the zigzag incision are one of its chief virtues, because they will not slough.

Skin edges with poor vascularity may be trimmed away slightly. A V-Y procedure to increase length of the finger skin is possible, but in any case, the zigzag scar tends to straighten out, thus adding length.

Slough must not occur. If skin vascularity is doubtful, an immediate FT graft may be applied. However I never found it necessary to use a skin graft in a primary fasciectomy.

A straight longitudinal incision directly over the longitudinal band is now favored by some surgeons. On such an incision, Z-plasty is necessary at joint level. But unless the Z-plasty flaps are small, their tips are at risk, especially the flap with distal base. For this reason, I preferred the zigzag incision which has obtusely angled flaps, secure from slough.

Operation

The operation is planned in advance. The incisions are marked with methylene blue before tourniquet pressure is applied. With hemostasis, loupé magnification and good light, fasciectomy should proceed rapidly but accurately, with tourniquet time in mind. The N.V. bundles should be retracted with button-hook retractors, and kept in view constantly.

Integrity of the flexor tendon synovial sheath must not be violated while doing a fasciectomy and the pulleys should be left intact. Fatty tissue should be preserved.

In the palm, I found scalpel dissection most useful. In the finger, a very small curved dissecting scissors is used with the utmost delicacy near the N-V bundles. Only fascia causing contracture at the time of operation is removed in the palm. In the finger a more complete removal is indicated.

In the typical case, a long zigzag incision extends from the pad of the ring finger (or long finger) to the heel of the hand. In other fingers and in the palm, incisions should be parallel to this primary incision. In the palm however, these incisions may be interrupted, in deference to blood supply.

The serpentine (sine curve) incision is inferior to the palmar zigzag incision because it has no hinge and no exact point of reference for closure. Also it does not permit the V-Y gambit.

Contracture at the MP joint is usually overcome without difficulty, by removal of the fascial “martingale” (a leather harness strap to prevent head-tossing and rearing by fractious horses).

Contractures at the PIP joint however, may be difficult to release, especially if they are long-standing. Meticulous removal of fascia from the palmar surface of the PIP joint is often successful. If not, the surgeon must decide whether future use of the hand and physiotherapy will increase range of PIP joint extension. Arthroplasty should be attempted only by those surgeons who consider themselves qualified, since joint stiffness or instability may ensue.

As to the finger affected, annulus, minimus and medius are frequently involved and in the order named. Although annulus leads the list in frequency, minimus is the most intractable, with PIP joint contractures that recur with avidity. This little finger often seems loathe to leave its curled up shrimp-like posture.

The removal of future “extensions” should not be attempted — and may be counter-productive.

The surgeon may be a sage, but he is not a seer!

Closure

Active dissection and fasciectomy being complete, tourniquet pressure is released — (don’t remove the cuff) and the arm is elevated for 5 minutes. Bleeders if any, should be clamped with fine points. Often there are none. The skin is closed with 5-0 nylon alternating horizontal mattress and plain sutures, to be removed in 7 and 14 days respectively.

Drainage

Drainage of the palmar wound with a split quarter-inch gum rubber tube was routine in my practice. A narrow strip of “rubber dam” is not satisfactory (if you want to keep a door open, put your foot in it, not a sheet of paper). Sometimes a finger incision will also need a drain to allow all bloody serum to escape.

Failure to drain invites seroma and hematoma with a flawed surgical wound, and healing by second intention. The drain should be removed by the surgeon himself in 24-48 hours and a dry gauze pad applied to the palm.

For 30 years I routinely drained all Dupuytren’s incisions in the palm and never had cause to regret it. The incidence of seroma, hematoma and infection was zero.

Splintage

Splintage is for “restraint” not for “immobilization” in the usual sense. An ample gauze dressing is applied with moderate pressure by Kling bandage — then a dorsal plaster shell to the hand and forearm,
extending to the fingertips. Gentle movement of uninvolved fingers is encouraged. Splint is retained 10-14 days.

Individual fingers which have been held in the acutely flexed position before operation, must not be splinted straight after operation. Blood supply may thus be compromised!

**Skin Graft**

If after fasciectomy, skin vascularity is doubtful or hopeless, an immediate thick split graft or free full thickness graft is applied. Dermato-fasciectomy, of recent advent, is now being done especially on the small finger and the palmar area adjacent to it, in an attempt to avoid recurrence in this digit. John Heston, of Melbourne, Australia whose lifetime experience of Dupuytren’s Contracture is most extensive has described such a dermato-fasciectomy with FT skin graft in his recent McIndoe lecture at the Royal College of Surgeons, 1985.

In 1949 I proposed a local rotation flap with skin from the dorsum of the small finger. This flap was rotated to the palmar base of the small finger after the MP joint contracture was released. Such a flap is occasionally useful.

**Fasciotomy**

Fasciotomy (blind) has been done since Dupuytren’s Contracture was first described. In V.A. facilities the surgeon often sees elderly patients, who have been hospitalized for other (more serious) conditions. A fascial band causing tenting of the palmar skin, tempts the surgeon to do a « blind » fasciotomy.

After considerable experience with blind fasciotomy over a number of years, I abandoned the procedure. It carries a 50% risk of injury to digital nerves, which is not acceptable. However, a « bandectomy » of a segment of the band may be done under local anesthesia — with the help of loupe vision and good light. The results of any fasciotomy are very temporary however, as the ends of the bands re-unite and re-establish the line of tension, leading to recurrence.

**The « open palm »**

The « open palm » lamentably violates the principles of sound healing in the hand. It ensures low-grade infection in a granulating wound, often resulting in stiffness which is slow to resolve.

The « seven surgical sins » in the surgical treatment of Dupuytren’s Contracture are as follows:

1. Rough handling of skin or tissues.
2. Severance of digital artery.
4. Skin slough of whatever size.
5. Seroma.
6. Hematoma.
7. Infection.

**Axiom:** the surgical wound after fasciectomy must be beyond reproach.

**NOTES ON ETIOLOGY**

**Genetic factor**

I have left the discussion of etiology to the end, because it is controversial and is still under active investigation. The most important factor in Dupuytren’s Disease is genetic. If you do not have the predisposition, you will not develop the « disease ».

It is seen most frequently in Northern Europeans or their descendants in other parts of the world. McFarlane in a recent article (1983) has described the genetic contributions of the Celts who traveled widely in Europe leaving their « handprints » as a manual trademark of this condition.

**Aging factor**

Dupuytren’s Disease also shows some characteristics of aging in the hand. It is not present in the young, and its progress by decades (in those predisposed) is remarkably similar to that of osteo-arthritis in the human hand. In the patient who has Dupuytren’s Disease at age 50, the condition is apt to be worse at age 60, worse still at age 70. As in osteoarthritis, it reaches a peak of activity which then tends to subside.

**Dynamic factor**

In 1970 I published a paper entitled « The Dynamics of Dupuytren’s Disease » in which dynamic factors were considered as a possible inciting cause. The hand consists of three components: radial, central and ulnar. The central component (rays II and III) is stable because of the stability of the second and third CMC joints.

The radial component (the thumb or first ray) swings freely on its triangular hinge, the thenar web, thus allowing opposition to the stable central component for grasping.

The ulnar component (rays IV and V) has relatively loose CMC joints which allow dorsal and palmar motion of the 4th and 5th metacarpal heads. This permits a unique function: lateral cupping of the hand.

The radial side of the hand which permits grasping is not immune to Dupuytren’s Disease which often appears in the thumb. In the thenar web there may also be a transverse band suggesting lateral stretching between rays I and II.

Hyperextension of the MP joint of the small finger is another dynamic factor. It is seen in some persons when they hold a cup of tea. Abduction of the small finger may add still another kinetic factor to the tensions involving that finger.

I once had a Finnish patient, a man age 50. He presented with a slight flexion contracture of the PIP joint of his small finger. I examined him and told him to return in three months. At that time he said, « Doctor, my finger is getting worse not better. I have been forcibly straightening my little finger every day, several times a day ». I was amazed to
find that his flexion contracture at the PIP joint had increased to 90 degrees. Was this a case in which the patient played a willful, albeit unknowing role in the acceleration of an existing minor contracture?

The tightly clenched fist is not a cylinder. It is a truncated cone with an extra-twist at the ulnar end. I believe that the forces related to the genesis of Dupuytren’s Contracture include that of torque, which creates a shearing force between the skin and the subcutaneous tissues. This may account for the frequent and intractable involvement of the small finger in which young subcutaneous fibrocytes engender recurrence.

When you look at the hand of a patient with Dupuytren’s Contracture you see a record of the stresses in the palmar fascia including tension, stretching, possible rupture of collagen fibrils within the fascia or subcutaneous, representing the lifelong use of the hand at work. These changes may be present in all parts of the hand including the thumb, the thenar web and rarely in the index finger, but they are most severe in the distal ulnar quadrant of the hand, involving the III, IV and V digits.

In making a tight fist, the small finger is more acutely flexed at all its joints than any other finger, the sum of joint flexion sometimes approaching 300 degrees, instead of 270 degrees as in the index finger. In making a fist, the small finger is rolled up more tightly than any other finger, because the ‘wheels’ are smaller and also because the thumb stands in the way of acute flexion of the index finger.

To summarize, I believe that the palmar fascia in all portions of the hand is of normal quality and strength during early life. In middle age, in those predisposed, changes begin to appear. The reason for this is not understood, but I believe that dynamic factors may be important in the genesis of the fibrocytic nodules within the fascia or in the subcutaneous space which result in recurrence.

CONCLUSION

Whatever its cause, Dupuytren’s Contracture is with us in North America; Northern Europe, and Australia. It presents an intriguing challenge to the hand surgeon who must carefully select those patients who will benefit from treatment. He must then use the utmost surgical skill in removing the contracted fascia.

The watch-words for good results are: Strict Selection and Fastidious Fasciectomy. With the passage of time, there will be some recurrences and some ‘extensions’. In the majority of cases however, the hands will be better and their owners will be grateful.

I do not wish to give the impression that I was able to avoid errors in case selection or surgical technique. I readily admit to my share of such errors, which in fact gave me the incentive for this ‘impressionist’ report!

POSTSCRIPT

The designation of this report as ‘impressionist’ brings to mind the exhibit of the great French impressionist painters of the late 19th century: (Monet, Degas, Renoir et al.) which are on display in a gallery in Paris, the ‘Jeu de Paume’ (game of the palm). In that very building the game of handball (pelota) was played 150 years ago, which was also the era of Baron Dupuytren.

REFERENCES