In 1831 Baron Guillaume Dupuytren, a surgeon at the Hôtel Dieu of Paris, described a condition affecting the hand characterised by a fibrous retraction of the middle part of the superficial palmar aponeurosis resulting in progressive irreducible flexion of the fingers. In fact, the disease has been recognised since the Middle Ages. The Okrkneyinga saga tells the story of a Danish baron whose hooked finger found miraculous cure after he fell during a pilgrimage. Today, Dupuytren’s contracture affects several million individuals in Europe and North America. The disease usually appears between 40 and 50 years of age, with a ratio of eight men to every one woman. Apart from familial history (its genetic transmission dates back to the Vikings) and diabetes, which are both major risk factors, alcohol abuse, smoking, medications such as phenobarbital or isoniazid and mechanical stress (i.e. rock climbing or manual labour) are suspected to increase the occurrence of the contracture. The treatment of Dupuytren’s contracture remained surgical until the middle of last century. Medical treatments were suggested, including colchicines, verapamil or intranodular injections of corticosteroids aimed at the atrophy of the fibrosis, but showed little effect. The spectacular results of needle aponeurotomy (NA) and the spread of the technique from France to the rest of Europe and North America during the past few decades has markedly improved the treatment of Dupuytren’s contracture worldwide.

Physiopathology
In Dupuytren’s contracture, the superficial foil of palmar aponeurosis undergoes a hypertrophic and dysplastic transformation. Fibroblasts multiply, forming nodules and cords and hooking themselves on fibrous structures: transverse carpal ligaments, pulleys, scars, skin and bones. The fibroblasts acquire retractile power, transforming into myofibroblasts, leading to skin retraction and finger contracture. Tension of the cord enhances the retraction. On the molecular level, various authors have reported an increase in immature collagen fibrils. Differential expressions of matrix metalloproteinases and excess in oxygen free radicals or tumour growth factor (TGF)-β have also been noticed.

Forms and Staging
Several clinical forms of the disease can be found: palmar, palmodigital and strictly digital. These particular forms are more difficult to treat. In young patients, contracture is particularly quick to evolve. Natatory forms implicate the superficial transverse intermetacarpal ligament, which prevents separation of the fingers. In derm-adhesive forms, skin wells and retractions are frequent. Staging of the deformations relies on the Tubiana scale, which counts four stages depending on the global flexion of the finger: stage 1, from 0 to 45°; stage 2, from 45° to 90°; stage 3, from 90° to 135°; and stage 4, over 135°.

Surgical Treatment
Selective (or limited) palmar fasciectomy is usually the first-choice technique for surgical treatment of Dupuytren’s contracture. Diseased tissue is removed under regional anaesthesia with the objective of extending the digit and preventing further retraction. Extra- or intra-articular arthrolysis is associated when
the flexion of the proximal interphalangeal (PIP) joint remains after removal of the cord; intra-articular arthrolysis exposes the patient to a higher risk of post-operative stiffness. Skin grafts are used in cases of adhesive forms or where there is a high risk of recurrence. Open palm techniques (pioneered by McCash) can also be used to attain complete skin cicatrisation in case of skin shortage. Buttonhole deformations of the finger are treated by tenotomy and elongation of the extensors. In the most advanced cases, where there are irreducible hooked fingers or multioperated patients, arthrodesis or amputation is performed. Drawbacks of the surgical techniques are the high rate of complications inherent in such procedures, including nerve and artery transection, complex regional pain syndrome and a long recovery period of three to six weeks.

**Needle Aponeurotomy**

NA was invented in 1972 by JL Lermusiaux. This technique was made possible by the technological progress in single-use medical needles, with their double sharp bevels being used as microscalpels (see Figure 1). The technique is ambulatory and can be performed in an ordinary medical clinic. The principle consists of one or several percutaneous sections of aponeurotic cords with the bevel of a needle (16-5/10th in Europe, 25G x 5/8 in the US). The same needle is used for the injection of local anaesthetic: 1–3cc of lidocain 2% is used inside and around the cord after a thorough disinfection of the skin with 1% iodised alcohol. A small amount of prednisolone acetate 2.5% can be added to the solution in the syringe (1ml per 5ml of lidocain) to prevent painful reactions after the treatment. In contrast to the other non-surgical techniques to treat Dupuytren’s contracture still in development, no enzyme is injected into the cord. Section of the cord is obtained by to-and-fro movements of the needle perpendicular to the palm, completed by a firm extension of the treated finger. A dry bandage protected by an elastic tape (Tensoplast®) should be kept in place for two days.

One to four aponeurotomies can be performed in a single session and the procedure can be repeated after seven days. One or two sessions are needed to treat Tubiana stage 1 and 2 diseases (see Figure 2). Treatment is always initiated from palmar to distal cords and from P1 to P2 in the finger. A thermoplastic splint worn at night is sometimes necessary in long-standing proximal interphalangeal forms with capsular retraction. Apart from dirty work, full use of the hand is allowed immediately. Two-week sick-leave is necessary only for those employed in manual labour.

**Complications of Needle Aponeurotomy**

Serious adverse effects are uncommon after NA. However, in fewer than one in 1,000 cases, rupture of one of the flexor tendons may occur within a few days of the procedure, which requires prompt surgical repair. Section of collateral nerve occurs in fewer than one in 1,000 cases. No complex regional pain syndrome involving the entire hand has occurred in our centre, and only three focal forms have been reported over 35 years of experience. Phlegmon is exceptional. Minor incidents occur in 1% of procedures, including skin breaks, temporary hypoesthesia, superficial infections and haematoma. This should be balanced with the high rate of complications following surgical management of Dupuytren’s contracture: section of nerve 5.2%, section of tendon 2%, section of artery 1.8%, complex regional pain syndrome (CRPS) 1.8%, infections 1–2%, amputations 0.1% and scars 100%.

**Results**

Immediate and five-year follow-up results are similar to surgical results. The immediate results are excellent with Tubiana stage 1 and 2 (89–92% reduction of the degree of contracture), good with stage 3 (83%) and intermediate with stage 4 (48%) disease, with no aggravation or failure, unlike in surgical series. After five years, results are sustained in stage 1, 2 and 3 (92, 74 and 57%, respectively), but in only 38% in stage 4. The recurrence rate reaches 50% in all series, but the safety, ambulatory mode and low cost of the technique make re-treatment easy in case of recurrence. Stage 4 treatment still shows insufficient results, which suggests that treating at earlier stages is preferable, and NA should be offered as first-line treatment in stages 1, 2 and 3. Technical improvements have allowed treatment of digital forms. NA can be used to treat post-operative reoccurrences of Dupuytren’s contracture, with the exception of retractile scars and capsular retractions of the PIP joint.

We must emphasise that NA is a delicate medical technique that should be performed by trained practitioners only using the
appropriate tools. Using a blade or troncular anaesthesia increases the risk of tendon damage, skin scar and nerve lesion.\(^{20}\)

**Needle Multiaponeurotomy**

Multiaponeurotomy consists of the treatment of an entire hand in one session of five to 15 needle aponeuromies. Recently, Beaudreuil and Coll reported results after 18 months of follow-up of a series of 42 patients with severe and complex forms (55 hands, 157 digits) who received an average of 8±3 aponeuromies in one session.\(^{24}\) Results in terms of degree of contracture reduction, disability measure by visual analogue scale and patient satisfaction were similar to those seen with classic aponeurotomy, with a minor adverse effects rate of 2%. Progress was maintained after 18 months, with a satisfaction score of 80%. Social and economic costs are still attractively low: no surgery room, no sick-leave (with the exception of dirty work) and no post-operative care.\(^{25}\)

**Current Decision Tree**

Indication for NA of a patient with Dupuytren’s contracture is easily determined by the ‘table test’. The patient is asked to apply his or her hand to a table palm-down. When the patient is no longer able to fully extend his or her hand on the table, the table test is positive and NA is indicated (see Figure 3).

**Reoccurrences**

Whatever the technique used, NA or surgical aponeurotomy, the reoccurrence rate reaches about 50% after five years. NA can always be repeated even after post-surgical relapse, with the exception of retractile scars.

**Comparison of Needle Aponeurotomy and Limited Fasciectomy – Surgical Indications**

In a randomised controlled trial, Van Rijssen and Coll compared NA with limited fasciectomy (LF) as a first-line treatment for Dupuytren’s contracture.\(^{26}\) In total, 125 hands (121 patients) were randomised to LF or NA as described by Lermusiaux. Outcome was evaluated one and six weeks later. After six weeks, the improvement of global contracture was higher after LF than after NA (79 versus 63%), but with no statistical difference between the two treatment strategies for Tubiana stage 1 and 2. For higher stages, results were better after LF then NA, and showed a 75 versus 47% improvement for stage 4. This could be explained by the fact that in this study, only one session of NA was performed for all Tubiana of Dupuytren’s contracture. The rate of complications was clearly in favour of NA, with a 5% major complication rate (haematoma, nerve injury and infection) after LF versus a 0% rate after NA. At six weeks, there were no patients in the NA group with flexion deficit compared with 19 patients out of 56 in the LF group. Patients treated with NA were more satisfied with the function of their hand at six weeks than those treated by LF (\(p=0.002\)), and experienced a lesser degree of discomfort. Today, one can admit the superiority of surgery only in cases of frequent reoccurrence by use of skin graft, failure of NA, buttonhole deformity and irreducible stiffness of the PIP joint by arthrolysis or arthrodesis.

**Associated Lesions – Knuckle Pads and Dupuytren’s Diathesis**\(^{27}\)

Dupuytren’s contracture can be associated with knuckle pads of the hand, Ledderhose’s disease in the foot and Peyronie’s disease.
Dupuytren's Contracture

In Peyronie's disease (1% association with Dupuytren's), fibrosis locates on the tunica albuginea of the penis. The diagnosis is easily made in the presence of Dupuytren's contracture, with the patient describing an acquired angulation of his penis when it is erect. Three injections of prednisolone acetate strictly into the nodule at three-week intervals and treatment with 1mg colchicine daily for three months results in a 50% rate of good results.

Conclusions

Dupuytren's contracture is a frequent affliction and can lead to progressive disability. Surgical treatment is aimed at advanced stages, requiring several weeks of convalescence and carries important risks of complications and reoccurrence. In trained medical hands, NA is a safe technique that can be used at earlier stages and bring immediate results. In cases of recurrence, treatment can be repeated. Therefore, NA emerges as a first-line treatment.

Histological Staging and Dupuytren's Disease

Recurrence or Extension after Surgical Treatment: A Retrospective Study of 124 Patients

The article discusses Dupuytren's disease and how it has a high rate of recurrence after treatment. The study focuses on the usefulness of histological staging in the prediction of recurrence and how there is a significant difference in the recurrence rate between the three histological types (p=0.04). Histological staging was independent of features of Dupuytren's diathesis. The article concludes that histological staging is a reliable method for predicting recurrence. However, it should be used in association with clinical data to determine precisely the prognosis of patients suffering from Dupuytren's contracture.

Visual and Computer Software-aided Estimates of Dupuytren's Contractures: Correlation with Clinical Goniometric Measurements

The article primarily reviews corrective surgery for Dupuytren's disease as it represents a significant proportion of a hand surgeon's workload. The article discusses the decision to go ahead with surgery, the success of surgery and how it requires measuring the degree of contracture of the diseased finger(s). The article discusses a study in which 60 patients with Dupuytren's disease are being monitored in terms of the recurrence of the contracture, and how it can inform surgical outcome, research and audit. The study concludes that visual estimations of Dupuytren's contractures correlate well with actual clinical goniometric measurements and improve further if measured with computer software. Digital images permit monitoring of contracture after surgery and may facilitate research into disease progression and auditing of surgical technique.

Editor's Recommendations

Histological Staging and Dupuytren's Disease

Recurrence or Extension after Surgical Treatment: A Prospective, Randomised Trial

The article discusses a study involving 79 patients with Dupuytren's contracture of the proximal interphalangeal joint to have either a 'firebreak' skin graft or a fasciectomy and if, after full correction, the skin over the proximal phalanx could be easily closed by a Z-plasty. The degree of contracture of the metacarpophalangeal and interphalangeal joints of the operated fingers was similar in the two groups and both were comparable in terms of grip strength, range of movement and disability at each follow-up. The article concludes that the recurrence rate was 12.2%. We did not identify any improvement in correction or recurrence of contracture after firebreak ermfosacsectomy up to three years after surgery.

Visual and Computer Software-aided Estimates of Dupuytren's Contractures: Correlation with Clinical Goniometric Measurements

The article primarily reviews corrective surgery for Dupuytren's disease as it represents a significant proportion of a hand surgeon's workload. The article discusses the decision to go ahead with surgery, the success of surgery and how it requires measuring the degree of contracture of the diseased finger(s). The article discusses a study in which 60 patients with Dupuytren's disease are being monitored in terms of the recurrence of the contracture, and how it can inform surgical outcome, research and audit. The study concludes that visual estimations of Dupuytren's contractures correlate well with actual clinical goniometric measurements and improve further if measured with computer software. Digital images permit monitoring of contracture after surgery and may facilitate research into disease progression and auditing of surgical technique.