DUPUYTREN’S DISEASE – NEW OPPORTUNITIES

Bilyana Bozhanina, Ruslan Popstefanov, Dimitar Raykov

Department of Orthopedics and Traumatology, St Anna University Hospital of Varna

ABSTRACT

Dupuytren contracture is benign fibromatosis of the palmar and digital fascia of the hand. The presentation of the disease is progressive flexion contraction of the digits and impaired function of the hand. The disease is common primarily in north Europe and it is found in Bulgaria as well. Dupuytren’s disease is known in the literature since 1614, but there are still unsolved problems. Etiology and pathogenesis is unknown and there are many hypotheses of related exogenous and endogenous factors. Multiple treatment options, including surgery and medical procedures, have been suggested but there is not yet an effective one.

MATERIAL AND METHODS: In this survey we represent review of the new concepts of management and treatment of Dupuytren contracture. The most recent treatments used are extensive percutaneous aponeurotomy and lipografting, injecting Clostridium histolyticum collagenase, shockwave therapy and radiotherapy.

RESULTS AND CONCLUSION: Each of the treatment options has certain advantages and disadvantages and further investigations are required for better outcomes.

Key words: Dupuytren contracture, dupuytren’s disease, surgical, treatment

INTRODUCTION

The digitopalmar contracture named after Dupuytren (1831), is a fibrous, proliferative hyperplasia of the pre-existing connective tissue structures of the fascia of the fingers and palm (1). It is a common disorder and affects 30 million people worldwide. The economic consequence of the impaired hand function leads to disability and affects the patient’s work life. They are faced with difficulties every day in their personal life- washing face and putting hand in pockets.

MATERIAL AND METHODS

The goal of this article is to make a review of the recent advances in treatment of Dupuytren’s disease including surgical and nonsurgical treatments. We performed retrospective literature review and we used the key words “Dupuytren contracture, needle aponeurotomy, advances, treatment, assessment surgical treatment, nonsurgical treatment, radiotherapy”. Articles, which we include was written only in English.

RESULTS

The incidence of the Dupuytren’s disease in the population is variable according to age, sex and ethnicity. It affects male gender predominantly in countries of northern Europe and Scandinavia. It is rare in dark colored skin individuals. According to MikkelSEN in a study of Norwegian population including 15 950 persons, contracture is registered in 10,5% of males and 3,1 of females (2). Burge consider that Dupuytren contracture is genetic inherited disorder of the connective tissue in 30%. It is common in Ger-
Dupuytren's disease – new opportunities

many, Russia, Great Britain. Although uncommon in most of Asia, Japan and Taiwan, have higher prevalence, comparable to the values reported in Northern European population. These patients present with less severe form of the disease, where only nodules are present, without formation of pathological cords. (3)

Dupuytren's disease affects both age and sex. Men are predominantly affected by the disease than women in 9:1, 6:1 ratio according to different sources (4). The disease has been reported in infants and children but there have been only a few articles up to now. The incidence is higher for men at the age of 50 and for women the 6th decade. By the ninth decade the prevalence across gender is equal (5). The recurrence rate is equal in both sexes. Bilateral disease is more common in men at 59 % versus 43% of women (6).

The etiology of the disorder remains unclear. Association between exogenous and endogenous factors has been researched. The disease is thought to be an autosomal dominant inheritance with variable penetrance (7). Heredity is the most plausible hypothesis and no gene has been defined yet. Certain predisposition exist, which under the influence of number of factors could occur in pathological condition. Studies have found that there is increased risk for Dupuytrens contracture in patients with underlying health conditions, such as diabetes mellitus and epilepsy. The higher prevalence is often believed to be related to the microangiopathy and increased collagen production (8). These patients also have increased rates of flexor tenosynovitis and carpal tunnel syndrome and other proliferative disorders in the hand. Arafa studied the association between epilepsy and Dupuytren contracture and has found prevalence similar to the general population (9).

Association between Dupuytren’s disease and exogenous factors such as smoking, alcohol consumption and manual labor is controversial. Studies of Burke and Goldtfredsen present higher incidence of the disease among smokers and alcoholics, and worse presentation as well (10,11). Others point that there are considerable group of patients suffering from this condition who have never smoked or drank alcohol (12). One statistical finding that should not be underestimated is that 42% of people with severe Dupuytren contracture died of cancer. It is evident that more investigation is needed to confirm what can be the cause of the disease (12,13).

The disease process is similar to wound healing which involves the proliferation of fibroblasts deposition of collagen, myofibroblast contraction, growth factors such as transforming growth factor β (TGF β) (14). Researchers found similarities between the presenting features of neoplastic process and Dupuytren's disease because of the high recurrence rate (14,15,16). The course of the disease includes three stages and it is described by Luck in 1959 - proliferative, involutional and residual stage. At first, only nodules are present at the base of the fingers and the skin of the distal palmar crease. In the involutional and residual stage the normal palmar fascia is changed into pathological fibrous cords and progressive digital flexion deformity occur. The palmar skin and underlying tissue thicken, the subcutaneous fat becomes fibrotic leading to attachment of the skin to the underlying fascial structures (16) (Fig.1), (Fig. 2).

Dupuytren’s disease may have a range of presentations especially in patients with strong diathesis. Ectopic disease can be either regional or...
distant ectopic disease. Regional presentation include Garrod’s nodes (dorsal Dupuytren’s nodule). These are fibrous lesions of the skin over the proximal interphalangeal joint and usually are associated with bilateral disease. Distant ectopic disease is found in patients with strong diathesis. Lesions of the plantar fascia is Lederhose disease (Fig. 3) (17) and lesions of corpus cavernosum is Peyronie’s disease (18).

**Surgical treatment**

Treatment of Dupuytren’s disease is a matter of discussion, there are surgical and nonsurgical treatment options. Historically surgery has been “the gold standard”, and limited fascectomy is the most frequently practiced procedure.

The indications for surgical treatment are metacarpophalangeal (MP) joint contracture of 30 degrees or greater, or proximal inerphalangeal (PIP) joint contracture of 20 degrees or greater with documented progression (19). The Hueston table top test is positive and contracture of this degree begins to cause functional complains such as difficulties in washing face or putting hands in pockets.

Surgical treatment options include open fasciotomy (20), closed fasciotomy (21), limited fascectomy, percutaneous needle aponeurotomy (PNA) (22,23,24 and enzyme fasciotomy (19,25,26). Surgical intervention does not cure Dupuytren’s disease. The aim of the surgical technique is contracture correction and joint contracture (27). All incisions must follow the basic hand surgery principles. No incision should cross a flexion crease under right angle. Using Brunner zigzag incisions the cord is dissected and pathological changed tissue, cords and nodules are excised. The wound is closed and if needed Z-plasty is performed. Mini-chevron incision is a new approach suggested by Papaloīzos. The idea of a new design of zigzag flaps as short as 4-5 mm with better preserved blood supply. Usually, one incision should be made for each affected ray or finger (18). Even the surgery is “the gold standard”, it has been found a high number of complications associated with it. They are divided in two groups – intraoperative and postoperative. The most common intraoperative complication is digital nerve injury reported as 3,4% in 15 studies reviewed. Postoperative complications include skin necrosis, infection, pain in the scar site. Patients report of joint stiffness and reduced flexion ability compared to their pre-operative state (28).

**Fig. 3. Progression of the disease**
Dermofasciectomy is a surgical method where the diseased fascia and the overlying skin are excised. The defect of the skin is covered by a skin graft. It is proposed by Hueston (29) in 1961 but it has never been popular. In a study of 143 digits the risk of recurrence was only in 12 rays -8.4% of rays, 11.6% of patients (30). Even that excisional surgery is established as standard treatment for the Dupuytren's contracture, the drawback is the long postoperative recovery period and high number of complications.

Percutaneous needle aponeurotomy or fasciomy is the first ever used method of treatment for the contracture. It is developed by Henry Cline in 1777 in London and later modified by Lermisiaux. Standard technique of needle aponeurotomy according to Lermisiaux is performed under local anesthesia. Using a 16 G injection needle the affected cords are cut and the full extension of digits is restored (31) (Fig. 4), (Fig. 5).

The technique is minimally invasive with short recovery period and the results compared to limited fasciotomy are similar. Disadvantage is reported in randomized controlled study which shows high recurrence rate of 64% (18,32).

Hovius et al. suggested combine fat grafting with a novel minimally invasive percutaneous release. In this procedure the fat graft is interposed in the space between the released cord and the underlying skin (33). It is reported that interposed graft prevent recurrence (34). The results are promising but further investigations are needed.

Nonsurgical treatment

Because of the complications described in the literature the need for less invasive methods uncover new possibilities. A great number of treatment options have been found as alternatives for surgery- administration of steroids (35,36), vitamin E, dimethyl sulfoxid, radiotherapy, ultrasonic therapy, hand therapy (37,38), enzymatic fasciotomy (39), collagenase (25,40,41).

Injectable Clostridial collagenase has gain popularity in the last few years. It is known as Xiaflex and also Xiapex in Europe. This treatment is approved in USA and in some countries in Europe. The collagenase clostridium hystoliticum consists of multiple collagenase subtypes. The collagenase enzym is injected into the cord where it disrupts the collagen bands (19). Several studies have been published until now. Overall, it can be concluded that the efficacy, safety, and complication profiles of CHCs appear to compare favorably with the current surgical techniques in adult patients with a palpable DD cord (25).

Tomasek et al., have investigated the effect of INF-gamma on myofibroblast and came to the conclusion that INF-gamma is able to suppress the differentiation of myofibroblasts and thus the contractile force is being reduced as well (12,42).

Knobloch et al, conducted a randomized-controlled study using focused extracorporeal shock waves in the treatment of in Peyronie’s disease. Results were promising, the pain was reduced and quality of life improved. The hypothesis is that focused extracorporeal shock wave therapy can be used as a non-invasive tool to decrease the force of contracture and reduce the fibromatosis of the palm (12,43).

In a follow-up of 13 years radiotherapy has proved to be effective in prevention the disease progression in early-stage Dupuytren’s contracture - 59% remained stable, 10% improved and 31% progressed (44).
CONCLUSION
Dupuytren’s disease is a common fibroproliferative disorder with unknown etiology. Up to now there are many hypotheses but not a clear answer. The first description of the contracture found in the literature was proposed by Cline and he suggested a surgical method for the disease in 1778 (18). Since then, there are a numerous techniques and methods in the management of Dupuytren’s disease. Each of them has its own advantages and disadvantages. Still, there is no clear indication which technique is appropriate for treatment an exact patient or a group of patients. Decision is made of the surgeon, which one he should prefer. Minimally invasive needle aponeurotomy has fast recovery and good first results but considerable high recurrence rate. Radical excisional surgery such as dermofasciectomy shows the opposite: low recurrence rate but high level of complication rate. Non operative techniques in example studies of clostridial collagenase report promising result, but it is expensive treatment. Among the most recent treatment options are multi-needle aponeurotomy, extensive percutaneous aponeurotomy and lipografting, injecting collagenase Clostridium histolyticum, INF-gamma and shockwave therapy. Further investigation should be made in order to fill in the gaps in the knowledge and concept of Dupuytren’s disease.

REFERENCES
2. Mikkelsen OA. Epidemiology of a Norwegian population. 1990;
Dupuytren’s disease – new opportunities

15. Luck JV. Dupuytren’s Contracture: A New Concept of the Pathogenesis Correlated with Surgical Management Dupuytren’s. 2009;


