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Achilles tendinopathy: new insights in cause of pain, diagnosis and management

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Summary

GENERAL INTRODUCTION

The prevalence of obesity in the Western World is rising, and therefore getting- and keeping fit has been increasingly important in the recent years. Endurance sports like triathlons and long distance running have gained popularity. Overuse injuries have become prominent in daily practice. General inactivity during the week followed by extreme exercise in the weekend allow for these types of injury to occur. 30-50% of all sports injuries are overuse injuries. Chronic Achilles tendon pathology is one of the biggest problems in sports involving running and jumping. In elite long-distance runners there is a lifetime risk of 52% of sustaining an Achilles tendon injury. However, it is not *always* related to excessive physical activity. Thirty percent of patients have a sedentary lifestyle. Recalcitrant Achilles tendons may cause pain for years and are often resistant to any form of treatment. In the end, chronic Achilles tendon complaints may be self-limiting. Especially athletes will not consent with this possible prospect. The cause of pain has not yet been clarified, and therefore its treatment is challenging and often unsatisfactory. The aim of this thesis was to elucidate the cause of pain, to develop appropriate assessment tools, to invent minimally invasive treatment methods, and to optimize diagnostic and endoscopic methods for chronic Achilles tendon problems.

CHAPTER 1

Terminology for Achilles tendon related disorders

The terminology of Achilles tendon pathology has become inconsistent and confusing throughout the years. A new terminology is proposed; definitions include the anatomic location, symptoms, clinical findings and histopathology.

Midportion Achilles tendinopathy: a clinical syndrome characterized by a combination of pain, swelling and impaired performance. It includes, but is not limited to, the histopathological diagnosis of tendinosis. *Achilles paratendinopathy*: an *acute* or *chronic* inflammation and/or degeneration of the thin membrane around the Achilles tendon. There are clear distinctions between acute paratendinopathy and chronic paratendinopathy, both in symptoms as in histopathology. *Insertional Achilles tendinopathy*: located at the insertion of the Achilles tendon onto the calcaneus, bone spurs and calcifications in the tendon proper at the insertion site may exist. *Retrocalcaneal bursitis*: an inflammation of the bursa in the recess between the anterior inferior side of the Achilles tendon and the posterosuperior aspect of the calcaneus (retrocalcaneal recess). *Superficial calcaneal bursitis*: inflammation of the bursa located between a calcaneal prominence or the Achilles tendon and the skin.

Finally, it is suggested that previous terms as Haglund's disease; Haglund's syndrome; Haglund's deformity; pump bump (calcaneus altus; high prow heels; knobbly heels; cucumber heel), are no longer used.

CHAPTER 2

Outcome measures and assessment tools

Thorough history taking and clinical examination are essential in diagnosing Achilles tendinopathy. Moreover, it is important to continuously evaluate the patients' progress with both validated subjective scoring systems, such as the VISA-A questionnaire, and with various validated functional tests. Also, general subjective complaints and ability to return to previous physical activity and sports are important outcome measures. Proper evaluations with validated tests are not only of importance for scientific purposes, but also to the practitioner and the patient to follow the progress with treatment and rehabilitation.

CHAPTER 3

Translation and validation of the Dutch VISA-A questionnaire for Achilles tendinopathy and applicability to non-athletes

In 2001, the Victorian Institute of Sports Assessment developed a self-administered questionnaire evaluating symptoms and their effect on physical activity for patients with Achilles tendinopathy. It has proven to be an effective outcome questionnaire in various languages. The aim of this project is to translate and validate the VISA-A questionnaire into the Dutch language (VISA-A-NL) and to assess its applicability to non-athletes. After translation according to a forward-backward protocol, 101 patients with complaints of Achilles tendinopathy were asked to fill out the VISA-A-NL at two time points together with VAS, FAOS and SF-36 questionnaires. Reliability, internal consistency, construct- and content validity were tested. The VISA-A-NL proved to be an excellent evaluation instrument for the Dutch physician. If applied to non-athletes, using a modified score (questions 1-6) is recommended. Correlation of VISA-A-NL with other questionnaires was moderate or poorer.

CHAPTER 4

Less promising results with sclerosing Ethoxysclerol injections for Achilles tendinopathy: a retrospective study

In patients with complaints of chronic midportion Achilles tendinopathy, neovascularisation around the Achilles tendon and structural changes in the area were observed, but not in pain free normal tendons. Local injections of the sclerosing substance Polidocanol (Ethoxysclerol) have shown to yield good clinical results in patients with chronic Achilles tendinopathy. After training by the inventors of the technique, sclerosing Ethoxysclerol injections were applied to 48 patients (53 tendons) in our center. Six weeks after the last injection, only 44% has less or no complaints. At 2.7-5.1 year follow-up, 53% had received additional treatments, and 3 of these patients (7.5%) still had complaints of Achilles tendinopathy. We were therefore

not able confirm the high beneficial value of sclerosing neovascularisation in patients with Achilles tendinopathy.

CHAPTER 5

Tendoskopie am Sprunggelenk und Fuß

In contrast to arthroscopy, which has become the preferred technique to treat intra-articular ankle pathology, extra-articular problems of the ankle have traditionally demanded open surgery. Open ankle surgery has been associated with complications such as injury to the sural nerve or superficial peroneal nerve, infection, scarring, and stiffness of the ankle joint. The percentage of complications reported with open surgery for e.g. posterior ankle impingement varies between 15 and 24%. The incidence of these complications has stimulated the development of extra-articular endoscopic techniques. Endoscopic surgery offers the advantages related to any minimally invasive procedure, such as fewer wound infections, less blood loss, smaller wounds and less morbidity. Aftertreatment is functional, and surgery is performed on an outpatient basis.

Tendoscopy can be performed for the treatment and diagnosis of various pathologic conditions, as described in this chapter. In Achilles tendoscopy the paratenon and the plantaris tendon are released, leaving the tendon proper untouched. This procedure results in a good outcome on short- and midterm follow-up.

CHAPTER 6

Relationship between the plantaris tendon and the Achilles tendon: an anatomical study

Pain in midportion Achilles tendinopathy is often most prominent on the medial side, where degenerative changes are also most often found. During Achilles tendoscopy, we find that the plantaris tendon is fixed to the Achilles tendon at the level of complaints. In chronic inflammation, adhesions between Achilles- and plantaris tendon, running collectively in the paratenon, may be formed. The Achilles tendon is involved in plantarflexion, whereas the plantaris tendon also contributes to ankle inversion. These opposite forces may cause pain in case of adhesions. The purpose of this study was to assess the anatomical position of the plantaris tendon and its relationship with the Achilles tendon. In all specimens a plantaris tendon was identified. 9 different sites of insertion were found, mostly medial and fan-shaped onto the calcaneus. In 11 specimens attachments between Achilles- and plantaris tendon were found at the level of complaints which may contribute to pain.

CHAPTER 7

Good outcome after stripping the plantaris tendon in patients with chronic midportion Achilles tendinopathy

Achilles tendinopathy is a problem that is generally difficult to treat. The pain is frequently most prominent on the medial side of the midportion of the tendon, where the plantaris tendon is running parallel to the Achilles tendon. The purpose of this study was to assess if excision of the plantaris tendon would relieve symptoms. Three patients with pain and stiffness at the midportion level of the Achilles tendon were treated by excision of the plantaris tendon. Pre-operatively these patients experienced recognisable tenderness on palpation of the medial side of the midportion of the Achilles tendon with localized nodular thickening at 4-7 cm proximal to the insertion. MRI indicated Achilles tendinopathy with involvement of the plantaris tendon. The plantaris tendon was bluntly retrieved and excised with a tendon stripper through a 3 cm incision in the proximal calf. We report a good outcome of this novel procedure in 3 patients with chronic midportion Achilles tendinopathy. The medial pain might be based on involvement of the plantaris tendon in the process, but well-designed studies need to be performed to confirm our hypothesis.

CHAPTER 8

Midportion Achilles tendinopathy: why painful? An evidence based philosophy

Several factors play a role in the cause of pain in a patient with midportion Achilles tendinopathy. When the demands of the tendon are higher than can be managed, micro-injuries develop. The body reacts with a repair process, which is inadequate in patients developing tendinopathy. This inadequate repair causes a repetitive cycle of inadequate collagen and matrix production, tenocyte disruption, a further decrease of collagen and matrix and an increased vulnerability to further micro-injuries. Vascular ingrowth to repair the defect arises from the paratenon. These bloodvessels are accompanied by sensory nerves, causing an increase in pain signaling by producing nociceptive substances past the critical threshold. Myofibroblasts proliferate which synthesize abundant amounts of collagen to repair the tendon proper, but also cause the formation of scar tissue around the tendon and consequently adhesions of the paratenon onto the Achilles tendon at the location of the neurovascular ingrowth. Scarring in turn may lead to obliteration of neovessels, impaired circulation and further contribute to the pathogenesis of Achilles tendinopathy, meaning that there is no further action towards repair. Nerves however will survive. Pain is often most prominent on the medial side of the midportion Achilles tendon. At this level, the plantaris tendon runs closely with- and parallel to the Achilles tendon. Adhesions between both tendons obstruct the opposite forces of these two bi- and tri-articular muscle groups. Repetitive traction onto

this richly innervated area might contribute to the medially located pain and stiffness during and after walking.

CHAPTER 9

Appearance of the weight-bearing lateral radiograph in retrocalcaneal bursitis

A chronic retrocalcaneal bursitis is caused by repetitive impingement of the retrocalcaneal bursa between the Achilles tendon and posterosuperior calcaneus. On physical examination, a prominent swelling is palpable lateral and medial from the Achilles tendon just proximal to the calcaneus. Standard lateral and anteroposterior radiography of the ankle is performed to assess foot deformities or bony abnormalities. To confirm diagnosis, ultrasound, MRI or even bone scans are performed. This chapter shows that a visible soft tissue swelling in the retrocalcaneal recess on standard lateral weight-bearing radiographs of the ankle is useful in diagnosing a retrocalcaneal bursitis and that expensive and time-consuming additional imaging is no longer necessary.

CHAPTER 10

Endoscopic calcaneoplasty

When a retrocalcaneal bursitis is confirmed and maximum conservative treatment fails, surgery is considered. Most often open procedures are performed; however, in our clinic the endoscopic calcaneoplasty was invented. Two portals are used, just lateral and medial to the Achilles tendon, directly proximal to the superior part of the calcaneus. During the procedure, the retrocalcaneal bursa, posterosuperior tuberosity of the calcaneus and synovitis are resected. Aftertreatment is functional and patients can resume their normal activities.

CHAPTER 11

Optimization of portal placement for endoscopic calcaneoplasty

Due to the local anatomy and swelling palpation of the superior part of the calcaneus can be difficult and portals can be placed too far proximal. The calcaneus in these cases cannot be reached properly resulting in a suboptimal procedure or, when the problem is recognized, a need to replace or lengthen the incisions. In this chapter, we measured the distance from the tip of the fibula to the posterosuperior calcaneus in different foot morphologies, as a tool for accurate portal placement. Portal location in patients with a flat foot should be at a mean of 15 mm from the tip of the fibula, in normal feet at 20 mm, and in cavus feet at a mean of 22 mm distal to the tip of the fibula. The various foot types show a marked overlap between the

distances from calcaneus to fibula, however we can conclude that in flat feet portal location is significantly more proximal to the tip of the fibula, when compared to cavus feet.

GENERAL DISCUSSION

216 Before treatment of different types of Achilles tendinopathy can be optimized, some basic issues need to be taken into account. First, we all need to start speaking the same language, which is important in both science and daily clinical practice. Worldwide standard terminology and validated outcome measures for both athletes- and non-athletes are important first steps. Secondly, the cause of complaints needs to be found. As is evidently the major concern in any pathology, it would help us define more accurate and individualized treatment strategies. Sclerosing neovessels did not seem to be the solution. It was tried to get focus off the intratendinous changes in midportion tendinopathy by formulating an evidence- based philosophy on the involvement of the paratenon and plantaris tendon. More research is needed to confirm this hypothesis.

In retrocalcaneal bursitis MRI is no longer indicated if the patient is appropriately assessed clinically and digital radiographs are available. The value of radiography after previous hind-foot surgery is currently under investigation. Portal placement in endoscopic calcaneoplasty needs to be standardized as swelling and local anatomy prevent proper assessment. In patients with flat feet portals should be placed more proximal than in cavus feet; further research with a higher number of patients is needed to find significant differences between all foot morphologies. Until then, for surgeons less familiar with the procedure fluoroscopy is advocated.