

November 1st, 2013



Dear Editor,

Please find enclosed the edited manuscript 6103 in Word format (file name: 6103-review.doc).

Title: Hallux Rigidus – Joint Preserving Alternatives to Arthrodesis: A Review of the Literature

Author: Hans Polzer, Sigmund Polzer, Mareen Brumann, Wolf Mutschler, Markus Regauer

Name of Journal: *World Journal of Orthopedics*

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The manuscript has been improved according to the suggestions of reviewers:

1 Format has been updated

2 Revision has been made according to the suggestions of the reviewer

In the following, we list the reviewers comments point-by-point (italicized and bolded) along with our responses and the changes prompted identified by page and line number. Page numbers and lines of the changes refer to the revised manuscript. Additionally, the revised text passages in our manuscript are noted by underlining.

Reviewer 00501335

This is great work, congratulations. No suggestions other than accept as it is.

We thank the reviewer very much for his commendation.

Reviewer 00505398

We thank the reviewer for his comments as they improve the manuscript. In the following we list all comments and the changes prompted.

Abstract sentence(S) 6 recommend (R) Numerous classifications make comparison of different studies difficult.

We changed the sentence accordingly.

Page 3, line 6f: Numerous classifications make comparison of the different studies difficult.

S 8 change(C) best to most

We changed the sentence accordingly.

Page 3, line 8f: The most studied procedure with reproducible results is the arthrodesis.

S 10 R Different motion preserving & joint sacrificing operations.

We changed the sentence accordingly.

Page 3, line 11f: Different motion preserving and joint sacrificing operations such as arthroplasty are available.

S 11 & 12 R joint & motion preserving

We changed the sentence accordingly.

Page 3, line 12: In this review we focus on joint and motion preserving procedures.

Core tip: S 1 change(C) relief to relieve

We changed the sentence accordingly.

Page 4, line 1f: If nonoperative treatment fails to relieve the symptoms of hallux rigidus surgery is indicated.

S 5 when procedure fails to relieve symptoms, performance of arthrodesis after resection of the joint is difficult and...

We changed the sentence accordingly.

Page 4, line 5f: Furthermore, in case the procedure fails to relieve the symptoms to perform an arthrodesis after resection of the joint is much more difficult and may require bone graft.

S 6 joint & motion preserving osteotomies are also of interest.

We changed the sentence accordingly.

Page 4, line 7f: Consequently, joint and motion preserving osteotomies are of great interest for treatment of hallux rigidus.

S 7 joint & motion preserving

We changed the sentence accordingly.

Page 4, line 8f: We here provide a review of the different joint and motion preserving alternatives for treating hallux rigidus and the studies available investigating these procedures.

Introduction S 1 & rest of paper change (MTP) to(MTPJ)

Page 5, line 2f: The term "hallux rigidus" refers to the osteoarthritis of the metatarsophalangeal joint (MTPJ) of the first toe.

Furthermore, we changed it throughout the entire manuscripts

Radiographic findings S 3 With advancement

We changed the sentence accordingly.

Page 6, line 14f: With advancement of the disease more of the joint surface is involved and subchondral cysts, sclerosis and bony proliferation at the joint margins occur and the joint narrowing progresses.

Arthrodesis S 2 joint & motion

We changed the sentence accordingly.

Page 7, line 24: Nevertheless, joint and motion preserving operations are appealing, because if they fail to relief the symptoms, an arthrodesis can still be performed.

Chielectomy: S 3 Change aggravated to more difficult

We changed the sentence accordingly.

Page 8, line 12: Furthermore, arthrodesis or arthroplasty are more difficult thereafter.

Moberg: should leave out S 11 The peak ... since this sentence is controversial & without reference

We removed to following sentence: The peak amount of hallux dorsiflexion during walking was unaffected by the proximal phalangeal osteotomy.

Waterman Green needs figure

We added a figure for the Waterman Green procedure.

Youngswick S 4 Further it tries to plantar translate the 1st metatarsal head which may decrease metatarsalgia & dorsal impingement.

We changed the sentence accordingly.

Page 11, line 15ff: Further it tries to plantar translate the first metatarsal head which may decrease metatarsalgia and dorsal impingement.

2nd Para s 6 This makes interpretation of these results difficult.

We changed the sentence accordingly.

Page 11, line 28f: This makes the interpretation of these results difficult.

Reviewer 00503848

Why did the authors not perform a systematic review so the readers know all techniques and all results are included? Now there is risk of bias in this narrative review.

We agree with the reviewer that a systematic review is desirable. Nevertheless, performance of a systematic review cannot guarantee that all trials are included. This is especially true, when multiple different terms for the same disease exist as in hallux rigidus (hallux flexus, hallux rigidus, dorsal bunion, hallux dolorosus, hallux malleus just to name a few). To ensure that we identify all relevant results two authors performed the literature search independently using various search terms. Furthermore other reviews and metaanalyses were used to cross check the search results and an extensive hand search in the reference lists of all relevant articles was performed. By this approach we believe that we were able to identify all relevant articles.

A table with the results (ROM, VAS, complications,...) has added value to this manuscript so the readers can compare the results of the different techniques.

Again, we absolutely agree with the reviewer that a table comparing the results of the different trials would be ideal. We tried to establish such a table. Unfortunately we stopped this effort in the process because it was not feasible. The resulting table resulted in confusion rather than in clearness. This was due to various factors. The different authors used different classification systems. Consequently, the enrolled patient cannot be compared. Further, the outcome measures and the assessment of these

varied greatly. The follow up period was not comparable. These are just a few of the difficulties in creating such a table. Again, we agree with the author that such a table would be desirable. Future studies will be necessary in order to create comparable results.

Another word for hallux rigidus is hallux limitus. Is a metatarsus primus elevatus another word for hallux rigidus or the consequence of hallux rigidus?

The term metatarsus primus elevatus was first introduced by Lambrinudi in 1938. He observed that in one of his patients with hallux rigidus...“it seemed as if the head of the 1st metatarsal bone was lying on a higher plane than that of the other four”... He concluded that this condition might be responsible for the development of hallux rigidus. Since then several authors have adopted the theory that a hallux primus elevatus leads to hallux rigidus. Nevertheless, the development of hallux rigidus remains controversial and numerous authors disagree with the thesis that a metatarsus primus elevatus is the cause for hallux rigidus as it can be also observed in patients without a hallux rigidus. From the literature it must be accepted as a deformity of its own or as Coughlin et al. (2003) propose it might be a secondary change due to hallux rigidus. Nevertheless, the correlation between these two deformities remains controversial.

In order to point this out more clearly we added the following sentences:

Page 5, line 18f: Another popular concept is that an elevated first ray, the so called metatarsus primus elevatus, leads to hallux rigidus.

Page 5, line 20ff: Coughlin et al. even propose that the metatarsus primus elevatus might be a secondary change due to hallux rigidus[4].

The authors do not discuss the incidence of hallux rigidus in general population.

We agree with the reviewer that the incidence of hallux rigidus is of great interest as it is a common cause for pain in the foot. Consequently we added the following sentences:

Page 5, line 11ff: Hallux rigidus is a common form of osteoarthritis in the foot^[4]. Radiographic signs for the disease can be recognized in 10% of people aged 20–34 years and 44% of people over the age of 80 years^[5].

The authors summarize the classifications. Do these classifications help in guiding treatment or prognosis? Are these really relevant?

We believe that the classification of the disease is of great interest. Many authors emphasize that the treatment options rely on the stage of the disease. Although in our opinion a joint and motion preserving operation can be performed in all stages, if the patient accepts such a procedure, a consistent classification is crucial in order to compare the results of the different procedures. Unfortunately, the classification systems used in the trials currently available differ. This aggravates the comparability of the different studies.

In order to make it more clear to the reader why we believe a good and consistent classification is important we added the following sentence:

Page6, line 22: Furthermore, in order to compare the results of different studies and procedures a consistent classification is crucial.

Is a short/tight Achilles tendon a predictor or a consequence of a hallux rigidus?

Some authors propose that a tight Achilles tendon can lead to hallux rigidus. The idea is that a tight Achilles tendon causes decreased dorsiflexion of the ankle. During gait the decreased dorsiflexion of the ankle increases the pressure on the first metatarsal phalangeal joint, thereby causing wear of the

joint cartilage. Yet, as also pointed out above regarding hallux primus elevatus, the underlying pathology causing hallux rigidus, remains controversial.

In order to point this out we added the following sentences:

Page 5, line 22: Taken together, the exact cause leading to hallux rigidus remains controversial.

The diagnosis is discussed but no words about the differential diagnosis, which other diagnosis can be mimic the symptoms of hallux rigidus?

From the literature available and our own clinical experience the diagnosis of a hallux rigidus is very clear based on the patient history, the clinical examination and the radiographic images. Differential diagnosis such as gout, trauma or hallux rigidus can be ruled out based on patient history, the clinical examination and the radiographic images.

Is an osteotomy helpful when the problem is a tight flexor hallucis tendon, what should be done then? How to diagnose a tight tendon?

The reviewer raises a very interesting question of the combination of a tight flexor hallucis tendon with hallux rigidus. To our knowledge it is not supported by the literature that a tight flexor hallucis tendon leads to hallux rigidus. To diagnose a tight flexor hallucis tendon the clinical examination is important. This situation would result in reduced dorsiflexion of the first MTPJ. The dorsiflexion could be increased by plantarflexion of the upper ankle joint thereby approximating the ends of the tendon. If the patient suffers from a combination of both, a tight flexor hallucis tendon and a hallux rigidus, one would think that a shortening osteotomy would lead to a relative lengthening of the tendon. If, after the osteotomy the dorsiflexion is still reduced, from our point of view, only a tendon lengthening could help to solve the problem. Nevertheless, this is just our theory as the literature regarding hallux rigidus does not help us to solve this complex problem.

There is no real discussion of the article and the authors repeat every paragraph that there is a low level of evidence with a low grade of recommendation.

We agree with the remark of the reviewer, that we did not include a separate discussions section. We rather decided to discuss the limitations of each of the procedures in the different paragraphs respectively. We believe that by this approach the manuscript is more clearly arranged and it is better to understand for the reader. We were hoping to identify a procedure with the best recommendation level. Due to the low comparability and the low level of evidence of the trials available, a low level of recommendation resulted for all procedures. Nevertheless, we believe that it is important for the reader to understand what the level of recommendation is for the different procedures. Consequently, from our point of view, the arrangement of the discussion in the different paragraphs rather than in a separate discussions section improves the manuscript.

Reviewer 00505402

Adding some illustration figures will help reader better understand the manuscript.

We thank the reviewer for this comment as it is of upmost interest that the reader gets a very clear idea of the different procedures. Consequently, we added one figure demonstrating the Watermann Green procedure and one demonstrating the Cheilectomy.

3 References and typesetting were corrected. All DOIs available have been included. If no DOI was available we scanned the first page of the article and attached them in a separate pdf file.

4 The manuscript has been proof read by a native speaker.

Thus, we believe that these revisions have focused and strengthened the manuscript's message. Therefore, we would like to resubmit our revised manuscript for your re-consideration hoping that these revisions will render the paper acceptable for you and the Journal. Thank you again for considering the manuscript for publishing in the *World Journal of Orthopedics*

Sincerely yours,

A handwritten signature in black ink, appearing to be 'Hans Polzer', written in a cursive style.

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