Supplementary file Module 6

Scoping question

How can recurrent symptoms be prevented in patients who have recovered from Achilles tendinopathy?

Literature search and selection

The scoping question includes the following sub-question: Which prevention strategies are effective in patients who have recovered from Achilles tendinopathy? A systematic literature analysis was performed and the following PICO was created to answer this question:

P: individuals who are symptom-free after recovering from Achilles tendinopathy.
I: a preventive intervention strategy.
C: no preventive intervention strategy used.
O: recurrent Achilles tendinopathy.

Important outcome measures

The working group considers the recurrence of Achilles tendinopathy after an episode of Achilles tendinopathy to be the primary outcome measure for this sub-question. The outcome measure may be self-reported or diagnosed by a healthcare provider. Imaging findings are not a relevant outcome measure for this sub-question.

The working group considered a 'number needed to prevent' (NNP) of 25 or less to be a clinically relevant preventive effect for recurrent Achilles tendinopathy. This would mean, for example, that the implementation of a preventive intervention in a group of 25 individuals with a previous Achilles tendinopathy should prevent at least 1 recurrence. This NNP was found to be clinically relevant in research into a preventive exercise intervention for hamstring injuries.[1] However, since there is no scientific literature on which this can be based for Achilles tendinopathy and there are multiple factors that determine the NNP, the extent of the effect of the individual interventions on the degree of clinical importance will be discussed in the considerations

Search and select (method)

With the support of an information specialist, a search strategy was developed on 10th of January 2019 to identify recently published articles on effectiveness of prevention of recurrent Achilles tendinopathy (Table 6.1). In these articles, the title and the abstract were assessed based on the criteria below.

Inclusion criteria:

- The study examines a prevention strategy aimed at preventing recurrence of Achilles tendinopathy.
- The diagnosis of Achilles tendinopathy was based on clinical findings (local pain and reduced loadbearing capacity).

Exclusion criteria:

- The article did not use an adequate control group (e.g. the contralateral Achilles tendon).
- The design was a preclinical study.

In addition, to answer sub-question 1, the presence of existing national and international guidelines was sought: the previous Dutch multidisciplinary chronic Achilles tendinopathy guideline (2007), guideline databases of the NHG, NICE, NGC and G-I-N. Existing systematic reviews were also searched.

Results

The systematic search for the prevention of relapsed Achilles tendinopathy yielded a total of 218 references after removal of duplications. None of the 218 references were suitable for answering this sub-question based on title and abstract. As a result, these references were not assessed in full text. The flowchart displays the selection process (Figure 6.1).

In addition, the working group based its considerations on information from the previous Dutch multidisciplinary chronic Achilles tendinopathy guideline (2007). The databases of the NHG, NICE, NGC and G-I-N did not contain existing guidelines on the prevention of recurrent Achilles tendinopathy. In addition, there were no systematic reviews on this topic available.

Literature Summary

Description studies

No studies were found that were suitable for answering sub-question 6.1.

Results

Not applicable.

Evidentiary value of literature

Not applicable.

Conclusion

Midportion and insertional Achilles tendinopathy

- Grade	Due to the lack of studies, no conclusion can be drawn about the effectiveness of preventive interventions for recurrent Achilles tendinopathy.

Considerations

No studies were identified that reported on the effectiveness of preventive interventions for recurrent Achilles tendinopathy. This is in line with the findings in the previous Dutch multidisciplinary chronic Achilles tendinopathy guideline (2007). The literature shows that in 27% of professional footballers with Achilles tendinopathy the injury was actually a recurrence.[2] This was in a study of footballers (53/194) with Achilles tendinopathy, where no distinction was made between the location of the symptoms (insertional or midportion). A higher risk of recurrence was found with a recovery time of 0 to 10 days (31% chance of recurrence) compared to a recovery time of more than 10 days (13% chance of recurrence). The 'recovery' in this context is comparable to a return to football. It is also unclear whether there was actually a complete symptomatic recovery, as this was assessed on the basis of missing training sessions and competitions due to the symptoms. Nevertheless, inadequate rehabilitation with an early return to sports loading may be a risk factor for the development of recurrent Achilles tendinopathy. The working group therefore recommends taking sufficient time to recover. The duration of the recovery time (i.e. the time to return to sports) will be strongly determined individually, but as a guideline it can be indicated that recovery usually takes months instead of days to weeks. In this case, recovery time is defined as the time to return to full symptom-free sports loading. Monitoring with benchmarks that are related to the individual's aim might aid in prevention of recurrent Achilles tendinopathy

The working group advises a gradual build-up of sports load after previous Achilles tendinopathy. This advice was also given in the previous Dutch multidisciplinary chronic Achilles tendinopathy guideline (2007). This gradual build-up is not only considered important in the period after the recovery from the injury. The working group stresses that a new gradual build-up of (sports) loading also has a preventive effect after a period in which load on the Achilles tendon has been reduced (e.g. a period of illness, holidays without (sports) loading or winter and summer break in many sports). For athletes it can be insightful to express this loading increase quantitatively. In practice, the so-called 'acute:chronic workload ratio' (ACWR) can be used. Studies of professional rugby players, footballers, cricketers and endurance athletes have shown that the risk of injury generally increases when the acute load (e.g. the total distance in a week) is more than 1.5 times greater than the chronic load (e.g. the average distance over the previous four weeks).[3-6] For example, if someone ran an average of 10 km in the past four weeks, the risk of injury may increase significantly with a load of more than 15 km in the following week. A disadvantage of this approach is that only the amount of training (distance covered) is determined, and other parameters of external and internal load are not taken into account. Other parameters that are measured during sport and may be relevant to monitor include: average speed and peak speed and the number of accelerations (external load) and/or average heart rate, heart rate zones and rate of perceived exertion (internal load). For each sport, the degree of importance of each individual load parameter may vary. In some cases, a

combination of internal and external load parameters can still be considered (e.g. rate of perceived exertion x running distance). This method can also be applied to inactive individuals. The number of steps taken per day can be recorded (often with an app or smart watch) and monitored.

The preventive effect of using this ACWR method on recurrent Achilles tendinopathy is not yet known. Based on the expertise and clinical experience of members of the working group, the increase of load can play an important role in the development of recurrent Achilles tendinopathy. The principle of the ACWR method can play a role in the education of both sporting and inactive individuals. Regulating the increase of loading could be an effective strategy for all individuals who have recovered from Achilles tendinopathy.

Another preventive intervention often recommended after recovery from Achilles tendinopathy is the continuation of isotonic exercise therapy of the calf muscles. The theory behind this advice is that it helps the calf muscles retain sufficient strength and reduces the load on the Achilles tendon through various mechanisms.[7] As a result, the risk of recurrence could be reduced. However, scientific research into effectiveness and optimal dosage of this intervention is lacking. Based on expert opinion, the working group advises to continue single-legged isotonic strength training of the calf muscles. The exercises do not need to be performed daily, as a guideline a frequency of three times a week can be used or the exercises can be incorporated into the training sessions. The total training load can be observed and adapted where needed. The working group cannot comment on the exact duration of preventive exercises, a defined period of the implementation of exercises may be sufficiently effective, but a positive preventative effect of life-long maintenance is possible.

Figures and Tables supplementary file Module 6

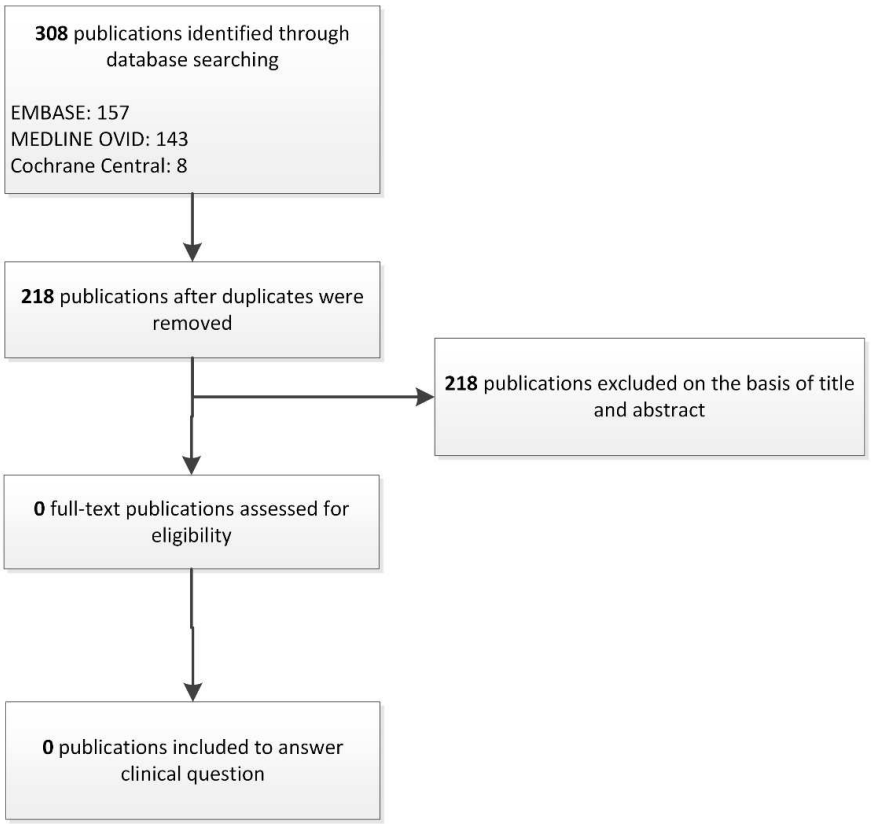

Figure 6.1 – PRISMA flowchart of the selection process for sub-question 1: Which prevention strategies are effective for individuals who have recovered from Achilles tendinopathy?

	Initial search	After deduplication
Embase.com	157	156
Medline ovid	143	58
Cochrane CENTRAL	8	4
Total	**308**	**218**

Database	Search terms
Embase.com	('Achilles tendinitis'/exp OR ((tendinitis/de OR pathology/de) AND 'Achilles tendon'/de) OR (((Achilles OR calcaneal) AND (tendinitis* OR tendinopath* OR tendinosis* OR tendonitis* OR tendon-patholog*))):ab,ti) NOT ((Conference Abstract)/lim) AND (English)/lim NOT ((animals)/lim NOT (humans)/lim) AND ('prevention'/de OR 'primary prevention'/de OR 'secondary prevention'/de OR 'tertiary prevention'/de OR prevent*:lnk OR (prevent*):ab,ti)
Medline ovid	(((Tendinopathy/ OR Pathology/) AND "Achilles tendon"/) OR "Achilles tendon"/pa OR (((Achilles OR calcaneal) AND (tendinitis* OR tendinopath* OR tendinosis* OR tendonitis* OR tendon-patholog*))).ab,ti.) AND English.lg NOT (exp animals/ NOT humans/) AND (Primary Prevention/ OR secondary prevention/ OR tertiary prevention/ OR prevent*.fs. OR (prevent*).ab,ti.)
Cochrane CENTRAL	((((Achilles OR calcaneal) AND (tendinitis* OR tendinopath* OR tendinosis* OR tendonitis* OR tendon-patholog*))):ab,ti) AND ((prevent*):ab,ti)

Table 6.1 – Search strategy for Module 6 (preventing a recurrence of Achilles tendinopathy).

REFERENCES

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7. O'Neill S, Watson PJ, Barry S. Why Are Eccentric Exercises Effective for Achilles Tendinopathy? Int J Sports Phys Ther. 2015;10(4):552-62.