

# The effectiveness of injections in cuffdisorders and improvement of diagnostics

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## Valorisation

### Introduction

In this valorisation chapter we describe the innovative aspects of the studies conducted for this thesis. The results of the performed studies have generated knowledge on aspects of treatment and diagnostics in cuff disorders. This new knowledge is of value for science, but also has socioeconomic implications.

### Innovation

In this thesis we have studied the effectiveness of injections in cuff disorders. We investigated the effectiveness of hyaluronic acid as a novel medicine for this type of shoulder complaints. We have shown that hyaluronic acid has unsatisfactory effectiveness in the treatment of cuff disorders and was less effective than corticosteroid injections. We could prove that corticosteroid injections work rather fast and are significantly more effective up to 12 weeks after injection.

In our search for the effectiveness of repeated subacromial corticosteroid injections, we discovered a booster effect of repeated injections. As far as we know this has not been described before in the treatment of cuff disorders. The repetition of an injection leads to an increased reduction in pain after corticosteroid injections as compared to hyaluronic acid and saline injections.

At present there are no strict guidelines stating the maximum number of repeated corticosteroid injections. The advice is to repeat when effective. Based on animal studies numbers of injection repetition up to six times a year are suggested.<sup>(1)</sup>

In the study described in chapter three we found a booster effect of the first and second injection, resulting in a decrease in pain during the first eight to ten days after injection. A third injection did not result in a further decrease in pain. Based on these results we propose a maximum of 2 corticosteroid injections.

A single physical examination test for shoulder disorders has a rather low sensitivity and specificity. Combining tests has been proven to result in a higher reliability.<sup>(2, 3)</sup>

For this thesis we have combined the empty can and drop arm test, two tests, examining pain and motor function, with a subacromial injection. With this combination we were able to show an improved specificity after injection as compared to a single test without subacromial injection.

Reproducible measurement of shoulder abduction and anteflexion was investigated with a novel test design using a three dimensional gyroscope. We could prove good to excellent reproducibility with this test design.

### **Social and economic relevance**

Shoulder related sick leave accounts for an incidence of approximately 16-18 %.<sup>(4)</sup> Most patients will suffer from complaints between six to twelve months.<sup>(5)</sup>

In this thesis we have shown that a positive result can be achieved after subacromial corticosteroid injections at the short and intermediate term (six months). Although not part of the research for this thesis, this positive effect can lead to earlier return to work. Especially since half of the medical cost of shoulder complaints in the first six months are generated by sick-leave.<sup>(6)</sup>

In this thesis we have presented the limited effect of repetition of subacromial corticosteroid injections more than two times. We also proposed a treatment algorithm in which test results and corticosteroid injections are combined. Change of the current therapeutic and diagnostic approach, based on these results and the proposed algorithm can lead to a faster diagnostic track and subsequently better therapeutic results.

Reduction of corticosteroid injection by means of reducing the number of repeated injections will only give limited change on a macroeconomic level.

### **Target Group**

The results of this thesis are relevant for health care workers in primary and secondary care.

In primary care large numbers of patients suffering from shoulder complaints are treated. Many family doctors are able to treat with corticosteroid injections, but at present the diagnostic tools in the Dutch setting might be improved. The results presented in this thesis provide another and novel diagnostic approach in which effectiveness of injections and physical examination are combined.

In secondary care patients suffering from shoulder complaints generally are treated by Rheumatologists and Orthopedic Surgeons. In the setting of secondary care more diagnostic resources are available compared to primary care. Nevertheless, the basic approach in which the effectiveness of a subacromial injection is combined with results from physical examination is applicable in secondary care as it is in primary care. Improvement of diagnostics and injection therapy might result in less use of costly high-tech tools as MRI.

Given the positive results of subacromial administered corticosteroid injections, they tend to be repeated too often in both primary and secondary care. The results presented in this thesis show these repetitions in a different perspective, and should be limited. This could result to shorter treatments.

### **Future research**

In this thesis we gave a description of a classification of the painful arc. Based on the available data we were not able to prove the reproducibility and validity of this classification. Future research could explore this.

Future research also should focus on the cost-effectiveness of the treatment of cuff disorders.

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