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Review Article

Surgical synovectomy for rheumatoid arthritis: a comprehensive literature review

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ABSTRACT

Surgical approaches for the management of rheumatoid arthritis (RA) are directed towards alleviating pain, restoring function and preventing further joint deterioration. Surgery is proposed only when conservative measures have failed. Multiple approaches have been designated in the management of the early and late disease. In this article, we reviewed the literature of one of the most common surgical procedure used in the treatment of RA which is synovectomy. A literature review was performed using the automated computerized PubMed search, with the keywords "rheumatoid arthritis, arthroscopy synovectomy, open synovectomy". Only papers written in the English language were included. References were screened to identify further relevant articles. Experimental studies, works published in non-indexed journals, case reports, letters, and viewpoints were excluded. A total of 77 articles reporting on surgical synovectomies were included.

Keywords: Rheumatoid arthritis, Surgical treatment, Synovectomy

INTRODUCTION

The aim of RA treatment is to control patient's signs and symptoms, to prevent joint damage, and to maintain the patient's quality of life and ability to function. As a result of the introduction of effective new drugs, such as tumour necrosis factor (TNF) inhibitors, less surgery is being undertaken and the goals of orthopaedic intervention for patients with RA have changed over time.[1-3]

Surgery is proposed only when conservative measures have failed and is mainly utilised to alleviate pain, prevent further joint deterioration and improve the function of severely affected joints that do not respond to medicine and physiotherapy.

When surgery is considered, a comprehensive approach is very important because of the complexity of the disease. RA does not only upset the musculoskeletal system, but its effects can also extend to other tissues all over the body. Further, patients with RA are at increased risk for infection, osteopenia and healing problems due to both the disease and the debilitating medications.

A variety of surgical procedures are adopted to manage musculoskeletal problems in RA. Surgery can include diagnostic, prophylactic or therapeutic arthroscopy or synovectomy, open synovectomy, arthrodesis or total joint replacement. Types of approaches will vary based on the connective tissues, bones and joints affected and the degree of the damage. Herein we review the literature on surgical synovectomy.

SYNOVECTOMY

The synovial membrane or stratum synoviale is a particular connective tissue that exists in synovial joints and lines the inner surface of the capsule.[4] When it becomes inflamed or irritated, the fluid production increases, resulting in warmth, tenderness, and swelling in and around the joint.[5] In general, inflamed synovium is accompanied by extra macrophage recruitment, fibroblast proliferation and an influx of inflammatory cells.[6] Subsequently, the thickened synovium, filled with cells and fibrotic collagenous tissue, can physically limit the joint movement. The fibroblasts may make smaller hyaluronan within the synovial fluid, making them a less effective lubricant of the cartilage surfaces. Furthermore, under the stimulation of the invading inflammatory cells, the synovial cells may also produce proteinases that can break down the extracellular matrix of the cartilage producing fragments which can cause more inflammation.[7,8]

Synovectomy refers to the destruction or the surgical removal of the synovium that lines a joint. It is one of the earliest surgical methods introduced to alleviate pain and reduce swelling in patients with severe RA.[9] There is a good evidence that synovectomy decreases the sensory innervation of the synovial tissues and explains the reduction of pain and improvement of mobility.[10] There is no evidence that it retards the bony destruction or the disease process.[11] Synovectomy can be performed in several different ways, which are namely, surgical, chemical and radiological. The surgical procedure can be performed arthroscopically or by classic arthrotomy to remove the synovium. Synovectomy can be used to treat certain joints, including; fingers, wrist, elbow, shoulder, knee and ankle joint.

A large number of authors have favoured arthroscopic synovectomy as it has been reported to have many benefits over open synovectomy.[12-14] These include minimally invasive surgery, shorter hospital stay and lower risk of stiffness. Arthroscopy helps to get a more precise diagnosis and it also allows better visualisation and therefore better chances of detecting small areas of inflamed synovium.

Although the results of synovectomy are not very impressive from the radiological aspect as from a clinical viewpoint, the result of the removal or attenuation of pain is often improved to the status of more than 10 years before and therefore valuable time is thus gained.[15]

Many studies have been conducted on the outcomes of both open and arthroscopic synovectomy and the majority of these said studies reported easing symptoms for a minimum of 2 years following the procedure. A very recent study was performed by Riches et al in 2016 to assess patients' satisfaction after hand and wrist surgery including synovectomies.[16] Overall, patients reported outcomes seem very positive across the range of surgical procedures that can be performed in the rheumatoid hand.

HAND AND WRIST

Wrist involvement is very common in RA and affects up to 50% of patients during the first 2 years of the disease.[17] Synovitis of the radiocarpal and mid-carpal joints can be very painful. The simple mass effect of the synovium within the wrist capsule causes pain.[18] A stable and painless wrist are very important for a normal hand function and since the wrist joint is implicated early in RA and the damage progresses rapidly, surgical treatment is of great value and synovectomy is always preferred to be performed before joint instability and destructive arthritis are established.[1,19,20]

A careful synovectomy or tenosynovectomy is the first stage of treatment and it is always recommended when radiosynoviorthesis fails or when reconstruction procedures are needed.[21,22] Although arthroscopic synovectomy of the wrist may not improve grip strength or range of motion.[23] It has proven to be beneficial in terms of pain relief and joint function with control of synovitis in over 75% of rheumatoid wrists and may delay the need for complex surgery, such as wrist arthrodesis or total wrist arthroplasty.[1,24-27]

Generally, the patients' reported outcomes in terms of function, stiffness and pain appear very positive across the range of surgical procedures.[28]

ELBOW

The elbow joint is estimated to be involved in 20 to 65 % of the patients with RA.[29]. Synovectomy has become the procedure of choice for rheumatoid patients with uncontrolled symptoms as it gives a good long-term outcome.[1,30-37] Synovectomy in patients with RA is often reported as a successful procedure that leads to pain improvement in more than 65% of the cases; however, it may not improve the range of motion significantly.[38,39]

Many authors have suggested synovectomy for mild to moderate disease and recommended it for the young and high-demand patients.[35,40-42] Elbow synovectomy can be performed arthroscopically or as an open procedure. Schmidt reported on arthroscopic synovectomy and found it to be most effective in cases when there is ligament laxity in the sense of a late synovectomy, as removal of loose bodies, smoothening of the cartilage, release of the joint capsule and possibly arthroscopy-assisted resection of the radius head can be performed.[43]

Nakagawa et al reported on open synovectomy by saying that they had satisfactory long-term outcomes. Their results showed significant improvement in pain, motion, and daily function from the intermediate to the long-term follow-up.[44] Tanaka et al found that elbows with a preoperative flexion arc of fewer than 90 degrees, had a

better function after arthroscopic synovectomy than those who had open surgery after midterm follow-up, and motion and function continued to be better in those patients at the most recent follow-up evaluation.[45]

Synovectomy of the elbow, both arthroscopic and open, has been proven that it helps in maintaining the elbow function for a long time, thereby in the process making valuable time to be gained before reconstructive surgery may become necessary.

SHOULDER

Shoulder joint involvement in patients with RA occupies the third place after the elbow and the hand.[46] Damage typically occurs late in the disease process and usually after other joints have established arthritic changes.[47]

The advances in arthroscopy have improved the acceptance of early synovectomy for the rheumatoid shoulder. Arthroscopic synovectomy has become one of the most recommended procedures, especially for those with non-progressive-type and for erosive-type shoulders before bone destruction progresses.[48] Further, it has been reported that Arthroscopic synovectomy offers satisfactory pain relief and improves the range of motion of the shoulder, especially in patients with intact rotator cuff. Those who need extensive soft-tissue repair and bone-remodelling procedures, open synovectomy is preferred.[49] However, in those patients in the more advanced stage of the disease, synovectomy may not give a significant effect.[42,50]

Kanbe et al reported on shoulder arthroscopic synovectomy in rheumatoid patients and found that when it is performed with surgical capsular release with or without biological treatment, it effectively improved function. Add to that, early onset of disease accompanied by a low prednisolone dose is of value in predicting the efficacy.[7]

KNEE

Many authors have considered synovectomy as a good treatment alternative for selected patients with early (Stage-I) rheumatoid arthritis that has proved resistant to standard medical therapy.[51-57] Synovectomy of the knee joints significantly for a long period of time relieves pain in the operated joint, it also improves the joint function and reduces the symptoms of the local joint lesion, which decreases general disability and improves the capacity for self-care.[58,59] The ideal patient for synovectomy must present an early disease absence of deformity or instability, good range of motion and preserved articular cartilage.[60-63] Many authors emphasize that a key factor in achieving satisfactory results after every synovectomy is rehabilitation, involving the range, amount of exercise, and physiotherapy contribution, based on the stage of progression of the disease process.[64,65]

Synovectomy can be done arthroscopically or using the open procedure. Both operations could treat chronic synovitis successfully. However, the arthroscopic synovectomy is the preferred operation due to faster recovery, which reduces the duration of hospital stay and enables the earlier recovery of function in the operated joint, with the resultant effect of less postoperative pain, less bleeding and excellent cosmetic effect.[66-68]

Some of the literature contains conflicting reports of the clinical results of rheumatoid knee synovectomy. In 1988, A controlled multi-centre evaluation of open surgical synovectomy in the treatment of RA was carried out over a period of 5 years after the operation.[69] The study showed that synovectomy, when performed at an early stage, did not decrease the recurrences of disease activity than when done after the greater damage had occurred. Further, the results showed the little long-term value of surgical synovectomy in the general treatment of RA or in the prevention of recurrences of disease activity or progressive articular damage. This was followed by a retrospective study in 1989 which discouraged late synovectomy and supported the opinion that deterioration of the rheumatoid knee cannot be prevented by early synovectomy, while Justen et al reported that late open synovectomy can delay the need for definite replacement surgery in nearly three-quarters of the patients.[70,71] Masłon et al despite having good results concluded, that the use of arthroscopic technique did not affect the amount of analgesic drugs taken by patients in the post-operative period.[67] Further, Blahut reported that arthroscopic synovectomy is a demanding surgical procedure associated with a high recurrence of synovitis. Open synovectomy is a radical intervention with minimum recurrences but is associated with a risk of a restricted range of motion if healing is not complete.[72]

ANKLE

Approximately 20% of patients with RA present initially with foot and ankle symptoms and most patients will eventually develop foot and ankle symptoms. Synovectomy for rheumatoid ankle has been reported to be a reliable treatment, it decreases pain and swelling significantly and improves the range of motion and the gait pattern .[73] Synovectomy of the ankle can be done arthroscopically or by open technique.

Arthroscopic synovectomy is reported to be a non aggressive and effective procedure in ankle joints affected by RA. Very good outcomes are expected when the procedure is performed early in the disease course and when there is no evidence of cartilage degeneration.[74,75] Choi et al, evaluated the results of arthroscopic synovectomy of the ankle joint in patients with mild degrees of RA and they concluded that arthroscopic synovectomy is a safe and reliable procedure in ankle joints affected by RA.[74] Good clinical results are expected when the surgery is done early in the disease

course and when there is no evidence of cartilage damage.

Many authors prefer to address the ankle by an open approach to better accessibility.[1] Mohing in 1989 reported on the outcomes of open synovectomy for rheumatoid ankles and found that it is beneficial in more than 80%.[76]

Anders et al also reported on open ankle synovectomy, by saying of the 81.5% assessed, they found the results of the synovectomy as good or very good.[77] Although there was a significant gain in the Kofoed ankle score because of pain reduction and gain of mobility, a decline of function was detected. Mohing also reported that synovectomy did not change the walking distance or dependency upon walking aids, probably because the ankle joint had been rarely the only joint of the lower extremity affected by RA.[76]

CONCLUSION

Functional impairment because of pain and joint damage and the subsequent loss of quality of life and inability to perform have become the main considerations for surgical intervention. When conservative measures fail, surgical intervention should not be postponed for so long that the benefit of successful intervention is diminished.

Synovectomy remains a local treatment option for those who do not respond to medicine and physiotherapy. Synovectomy is utilised to alleviate pain, in preventing further joint deterioration and improve the function of severely affected joints. The majority of the authors have reported good clinical outcome results postoperatively and the majority preferred arthroscopic techniques as it has many advantages over the open procedures.

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