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REVIEW ARTICLE

Indications and outcomes of shoulder arthroscopy after shoulder arthroplasty

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Background: Arthroscopy is a widely used intervention in the treatment of a variety of shoulder conditions. Arthroscopy has also been selectively used in symptomatic patients after shoulder arthroplasty. The purpose of this systematic review was to determine indications for shoulder arthroscopy in patients after shoulder arthroplasty and to report patient outcomes after these procedures.

Materials and methods: The electronic databases MEDLINE, EMBASE, and PubMed were searched and screened in duplicate for studies involving shoulder arthroscopy in shoulder arthroplasty patients. A full-text review of eligible studies was conducted in duplicate, and references were searched using predetermined inclusion and exclusion criteria.

Results: The review included 11 studies containing 84 patients. All were Level IV evidence. The most common indications for shoulder arthroscopy in the setting of shoulder arthroplasty were pain or loss of range of motion without a clear diagnosis, suspected periprosthetic infection, and rotator cuff assessment. Although 92% of patients were satisfied with the procedure and standardized shoulder scores increased in all studies that reported them, 44% of patients still went on to additional revision surgery after arthroscopy.

Conclusions: Shoulder arthroscopy in patients after arthroplasty is most frequently used as a diagnostic tool; however, it has utility in treating a number of predetermined pathologies. Despite the low sample size and quality of evidence in our review, patient satisfaction after arthroscopy is high because standardized outcome scores improve, and the risk of complications is low. However, a high percentage of patients who receive arthroscopy later require further surgery.

Level of evidence: Level IV, Systematic Review.

Keywords: Shoulder arthroscopy; shoulder arthroplasty; systematic review; infection; rotator cuff tear; shoulder revision

Shoulder arthroplasty is a commonly performed procedure with generally high patient satisfaction.[6,26,29] It is also an evolving area of orthopedic surgery, with the advent and

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development of reverse total shoulder arthroplasty showing promising results in the management of rotator cuff arthropathy and complex proximal humeral fractures.[23] Despite the widely reported success and reliability, some shoulder arthroplasty patients still experience an unsatisfactory result.[4,26] Causes of failure in shoulder arthroplasty include component loosening and malposition,[33] infection,[24] instability, dislocation, and rotator cuff tears.[34] One method that has been reported for diagnosing and treating problematic shoulder arthroplasty is arthroscopy.[27]

Minimally invasive surgeries, including shoulder arthroscopy, have become increasingly popular due to purported advantages such as reduced risk of infection, reduced soft tissue dissection, decreased postoperative pain, and shortened hospital length of stay.[2,14] The indications and outcomes for arthroscopic treatment of a variety of conditions in the native shoulder joint have been reported extensively in the literature.[1,25,32] However, there is a relative paucity of information addressing the use of shoulder arthroscopy after shoulder arthroplasty. Arthroscopy may have unique advantages in the setting of previous arthroplasty because metal artefact can significantly compromise the diagnostic utility of advanced imaging studies.

There is good evidence surrounding the use of arthroscopy after total hip and knee arthroplasty. The use of hip arthroscopy after hip arthroplasty has been systematically reviewed,[15] and a wide variety of indications for knee arthroscopy after arthroplasty are described, including diagnosis and treatment of infections,[8,28] arthrofibrosis,[31] and impinging hypertrophic synovitis.[31] These indications in particular have been described as complications of knee and hip arthroplasty, which raises the question: Can similar problems be addressed in the shoulder? Therefore, the aim of this study was to systematically review the existing literature to determine the indications and outcomes of shoulder arthroscopy in patients with previous shoulder arthroplasty.

Materials and methods

Search strategy

Two reviewers (N.S.H., D.D.) searched three online databases (EMBASE, MEDLINE, and PubMed) for literature related to shoulder arthroscopy in patients with previous shoulder arthroplasty. The database search was conducted on February 28, 2015, and retrieved articles from database inception to the search date. The research question and individual study eligibility criteria were established a priori. The inclusion criteria were (1) all levels of evidence, (2) male and female patients of all ages, (3) studies published in English, (4) studies on humans, and (5) studies reporting any outcome-related information on patients who had a shoulder arthroscopy after shoulder arthroplasty. Exclusion criteria were any nonsurgical treatment studies (eg, conservative treatment, technique articles without outcomes, cadaveric studies, review articles, etc) and studies where outcomes for the patient population of interest could not be separated from other patient outcomes (eg, pooled outcome data for shoulder arthroscopy in patients with and without previous shoulder arthroplasty).

The following key terms were used in the search: ''shoulder,'' ''arthroscopy,'' ''prosthesis,'' ''arthroplasty,'' and ''replacement.'' The search strategy is presented in Appendix Table I (available online).

Study screening

The 2 reviewers independently screened the titles, abstracts, and full texts of the retrieved studies in duplicate, and any discrepancies at the title and abstract stage were resolved by automatic inclusion to ensure thoroughness. Discrepancies at the full-text stage were resolved by consensus between the 2 reviewers. The references of included studies were screened to capture any articles that might have been missed by the initial search strategy. A list of references for the papers deemed ineligible at the full-text review stage can be found in Appendix Table II (available online).

Data abstraction

The 2 reviewers independently abstracted relevant study data from the final pool of included articles and recorded these data in an Excel spreadsheet (Microsoft Corp, Redmond, WA, USA) designed a priori. Demographic information included author, year of publication, sample size, study design, level of evidence, patient demographics (ie, sex, age, time from index arthroplasty, etc), and details of the procedure performed. Outcome information was documented. The number of patients requiring further surgery and any additional complications were also abstracted.

Statistical analysis

A weighted κ was calculated for each stage of article screening to evaluate inter-reviewer agreement.[19] Agreement was categorized a priori as follows: $\kappa > 0.61$ to indicate substantial agreement, $\kappa = 0.21$-0.60 to indicate moderate agreement, and $\kappa < 0.20$ to indicate slight agreement.[18] Descriptive statistics, such as means, ranges, and measures of variance, including standard deviations and 95% confidence intervals (CIs), are presented where applicable.

Results

Study identification

Our initial literature search yielded 749 studies, of which 11 met the inclusion and exclusion criteria for this review (Fig. 1). There was substantial agreement among reviewers at the title ($\kappa = 0.77$; 95% CI, 0.71-0.83) and abstract ($\kappa = 0.88$; 95% CI, 0.79-0.96) screening stages, and perfect agreement at the full-text screening ($\kappa = 1$).