

Surgical Exposure for Reverse Total Shoulder Arthroplasty

Differences in Approaches and Outcomes



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KEYWORDS

• Reverse shoulder arthroplasty • Outcomes • Surgical approach

KEY POINTS

- Reverse shoulder arthroplasty via deltopectoral and anterosuperior surgical approaches can yield similar early clinical outcomes.
- Previous studies raise concern of a greater risk of notching with an anterosuperior approach and a greater risk of dislocation with a deltopectoral approach.
- Our clinical data show greater likelihood of superior tilt of the glenosphere and valgus position of the stem in the anterosuperior approach.
- Unique radiographic outcomes and complications exist for both surgical approaches and should factor into the decision-making process regarding the appropriate surgical approach for reverse shoulder arthroplasty.
- Longer-term follow-up is needed to determine whether variability in postoperative radiographic measurements seen in these two approaches contribute to the long-term survival of reverse shoulder arthroplasties.

INTRODUCTION

Reverse total shoulder arthroplasty (TSA) has been approved for use in the United States since 2004 for the treatment of various shoulder conditions, including cuff tear arthropathy,^{1,2} proximal humerus fracture,^{3–5} rheumatoid arthritis,^{6,7} osteoarthritis,^{1,8,9}

and revision arthroplasties.⁹ The reverse prosthesis restores the deltoid moment arm and establishes fixed-fulcrum kinetics in the presence of substantial rotator cuff dysfunction with the postoperative goals being improved clinical function and relief of pain.^{1,10,11} Although the reverse TSA has advanced the treatment of shoulder disorders, the ideal

Disclosure: There was no outside funding or grant received that assisted in this study. G.R. Williams receives consulting fees, lecturer fees, and inventor royalties from DePuy. G.E. Garrigues receives consulting fees from Tornier as well as research, resident, and fellow education support from Zimmer, DJO, and Synthes. This research was completed before these interests began. The remaining authors have no financial interests to disclose.

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Orthop Clin N Am 46 (2015) 49–56

<http://dx.doi.org/10.1016/j.ocl.2014.09.015>

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indications, surgical techniques, implant designs, and rehabilitation protocols continue to be refined. The optimal surgical approach is one of the variables that remains controversial.

In the past, a transacromial approach was described by Grammont but has fallen out of favor.⁷ The 2 surgical approaches currently used when implanting a reverse prosthesis are the anterosuperior (AS)^{12,13} and deltopectoral (DP)^{14–16} approaches. Both approaches allow safe and reproducible exposure of the glenoid and humerus, allowing implantation of a reverse TSA. Selection of a particular approach depends on a combination of factors, including surgeon preference and patient-specific variables. This article describes the surgical approaches, discusses advantages and disadvantages of each approach, reviews the current literature, and presents data from our clinical experience.

DELTOPECTORAL APPROACH

Technique

The DP approach has been described previously (Fig. 1).^{1,15} In brief, an incision is made in the anterior portion of the shoulder approximating the DP interval. The cephalic vein is identified and is most often retracted laterally with the deltoid. Subdeltoid and subacromial adhesions are bluntly released and the clavipectoral fascia is incised. The biceps is then identified (if present), traced through the rotator interval, and tenotomized or



Fig. 1. Typical skin incision for a DP approach.

tenodesed. When present, the subscapularis is detached from the lesser tuberosity by using a tendon peel approach, a tenotomy that leaves a cuff of tissue for later repair, or is reflected with a lesser tuberosity osteotomy. The capsule is released from the humerus past the 6 o'clock position. Humeral head osteophytes are removed and the humerus is prepared per the manufacturer-specific instrumentation. After the humerus is prepared, the glenoid is exposed in standard fashion and prepared. Once final components are placed, the shoulder joint is reduced, and wounds are closed over a deep surgical drain. The subscapularis is repaired at the conclusion of the procedure in most cases; however, this is based on surgeon preference and tendon integrity.

Advantages

The DP approach has several advantages. The interval is an atraumatic, internervous, and intermuscular plane between the deltoid and pectoralis major. As such, it is an extensile approach that allows unencumbered access to the entire humerus. The deltoid origin is preserved and the muscle bellies are not violated. Given that a reverse arthroplasty is powered primarily by the deltoid muscle, reducing trauma to the deltoid has a theoretic advantage. In addition, the approach results in release of the anterior soft tissues and anterior dislocation of the humerus, which can improve visualization and access to the inferior humeral osteophytes. This approach allows better assessment of the native humeral anatomy and can provide access to the inferior capsule for release in particularly tight shoulders.

Disadvantages

The DP approach has several drawbacks. Although the role of the subscapularis in the function or stability of a reverse arthroplasty is controversial,¹⁷ several studies have associated subscapularis dysfunction with greater risk of instability.^{14,18} The DP approach requires a tendon peel, tenotomy, or an osteotomy of the subscapularis and may increase the risk of instability. In addition, visualization and instrumentation of the posterior glenohumeral structures, in particular the posterior glenoid and the greater tuberosity (in cases of fracture), can be difficult from an anterior approach. This difficulty could theoretically result in the baseplate being placed in an anterior or anteverted position. In addition, compared with the AS approach, the DP approach has been reported to have a higher incidence of nerve injury in anatomic shoulder arthroplasty.¹⁹ The same may be true for reverse arthroplasty.

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