Editorial

Arthroplasty of the shoulder joint

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In 2016, the shoulder community hails the forward thinking of Charles S. Neer, II who designed the first shoulder replacement system to deal with painful arthritic shoulders. The solution was clearly needed: shoulder replacement has increased, developed, and surged with leaps and bounds all over our planet (53,000 shoulder replacements are done annually in the USA only). The initial clinical problem catered for was degenerative joint disease of the shoulder joint, but the principle proved so successful that other pathologies of the shoulder that proved to be amenable to related procedures.

Before dealing with those "other" problems managed with shoulder arthroplasty, we should first reflect on the realities of glenohumeral arthroplasty. Although survivorship of the prosthetic replacement of the shoulder has been acceptable, it is not equal to the hip and knee. The failure/weak point is mainly the glenoid component which seldom gives more than 10–15 years of survival.[1] Significant attention has been paid to the glenoid component's longevity and latest developments include (a) Avoiding excessive reaming of the glenoid with respect to the subchondral bone as reaming into cancellous bone favors early loosening of the glenoid component.[2] (b) New glenoid component designs have different radii to fit the glenoid radius and thus avoiding to have to ream the glenoid to fit the back surface of the prosthesis - the prosthesis conforms to the glenoid. (c) In cases with glenoid erosion (B2 type), excessive reaming of the glenoid to achieve neutral version is not recommended, and use of posterior augmented components or even a reverse prosthesis may be considered.[2-4]

The concern about the survivorship of the glenoid prosthesis is most relevant when considering the common problem of degenerative joint disease in younger individuals (younger than 60 years). This has led to some of the following considerations: (a) Using only hemiprostheses in younger patients seemed to be a solution and is still practiced in many centers. The stark reality has been that in many of those patients, significant erosion of the glenoid has been observed and the opinion has swung against using metal hemiprostheses.[5,6] (b) Glenoid resurfacing seemed to be a reasonable option for selected cases, and various forms of biological glenoid resurfacing procedures have been done (allograft material and human dermis). (c) Acceptable results have been published for these methods, but there have been constraints like availability, cost, and laws prohibiting the use of human tissue in many countries.[7,8] (d) Simple arthroscopic debridement, capsulotomy, and removal of osteophytes have been suggested by some authors with varying degrees of success.[9] Admittedly, these less invasive procedures are intended to "play for time" to extend the actual date for prosthetic replacement. (e) A new development has been the pyrocarbon hemiprosthesis which seems to be "gentle" to the glenoid with decreased erosion of bone; this may offer a solution in the younger patients, and long-term outcome is awaited.

The brilliant concept of reverse geometry prosthesis was designed by Grammont and Baulot, and was intended for rotator cuff arthropathy (arthritic shoulder with an absent rotator cuff).[10] By medializing the center of rotation with the semi-constrained design, it offered an increase of strength to the deltoid. The reverse prosthesis became a most successful solution, and the indications for the prosthesis expanded are as follows:

a. In severe bone loss, especially on the glenoid side, including the advanced B2 configurations and bone grafting, the reverse prosthesis was a good solution[5]
b. In difficult cases of fracture sequelae with malunions and loss of the tuberosities, possibly the only solution is the reverse prosthesis[11]
c. For revision cases where the glenoid is damaged significantly, bone grafting and reverse replacement are often the only solution (in some cases, particularly with noncontained bone lesions, requiring two-stage revision)[12]
d. Loss of rotator cuff muscles with no arthritis: this needs special mention as there has been a tendency for surgeons to resort to reverse prosthetic replacements for cases with difficult and irrepairable rotator cuff lesions. Considering the potential complications that could be encountered in prosthetic replacement, attention should be given to all the available solutions for such difficult rotator cuff tears.

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With good arthroscopic technique s and fixation methods, 90% of rotator cuff tears are repairable.[13,14] It is, therefore, not indicated to resort to reverse replacement in many such cases. Tendon transfer procedures have been shown to be most effective and carry a lower complication risk than prosthetic replacement:

- Latissimus dorsi tendon (with or without teres major) transfer for posterosuperior cuff lesions[15]
- Lower head of trapezius transfers for posterior cuff lesions[16]
- Pectoralis major, pectoralis minor, and latissimus dorsi transfer for anterosuperior lesions[17]
- Arthroscopic superior capsular reconstruction for lesions of the supraspinatus and infraspinatus[18]

e. Tumor surgery: In cases where the proximal humerus has to be removed, the reverse prosthesis has been a valuable part of the treatment to afford the patients some acceptable function[19]

f. Proximal humeral fractures: in elderly, osteoporotic patients with four part fractures, hemi fracture prostheses often led to poor results due to the nonunion of the tuberosities. Superior migration of the prosthesis and painful poor function were the common results. The advent of the reverse prosthesis circumvented those problems as function could remain acceptable without relying on the greater tuberosity and superior cuff.[20] Later versions of the reverse prosthesis have now become available which allows for ingrowth of the tuberosities with even better function.

In summary, shoulder arthroplasty has evolved since Charles S. Neer, II first designed his hemiprosthesis. Several options are available, and shoulder surgeons must consider all different possibilities (techniques and prosthetic choice) to treat their patients for their optimal results.

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