

**THE BIPOLAR SHOULDER PROSTHESIS
LONGER TERM RESULTS (5-10 YEARS)
IN THE MANAGEMENT OF END-STAGE
ROTATOR CUFF ARTHROPATHY**

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Abstract

This prospective clinical study evaluates the 5-10 year results of the BiPolar shoulder Arthroplasty in patients with end-stage Rotator Cuff Arthropathy. The study group consisted of 48 patients (59 shoulders). Average age was 72 years and average FU time was 73 months.

Results showed that the average UCLA score went from 7.9 Pre-op to 23.3 Post-op. Final Constant score averaged 52% (unadjusted). Pain relief using the VAS was 1.2 (were 0 = no pain, 15 = excruciating pain). ROM improved by an average of 20°. There were 2 reoperations because of periprosthetic fractures.

Despite rather poor functional results, these patients were satisfied with their pain relief and the functional gains accompanying pain relief would be an added benefit.

Introduction

Management of the cuff deficient shoulder with end-stage arthropathy is a complex and challenging problem for the orthopaedic surgeon. Approximate 5% of patients with irreparable or failed RC repairs will develop arthropathy and hemiarthroplasty has become the procedure of choice.^{1,2}

BiPolar shoulder arthroplasty was first developed by Swanson et al, in 1975, for complex primary cases and a salvage procedure for the arthritic shoulder with a massive Rotator Cuff tear.^{11,12}

The Bi-Angular BiPolar shoulder (Biomet, Warsaw, IN) system was developed in 1990 and has been used as an alternative for painful conditions of the shoulder including end-stage RC arthropathy providing pain relief and function with a low complication rate.¹³⁻¹⁵

Materials and Methods

Between April 1991 and March 1997, 59 BiPolar shoulder arthroplasties were performed on 48 patients with end-stage RC arthropathy. Average age was 73.4. By the time of review 10 patients (11 shoulders) were deceased. One patient was lost to FU (from Vietnam) and two patients (2 shoulders) were unassessable because of Alzheimer's disease.

We used clinical examination, Visual analogue pain scale, UCLA and Constant Scores and Radiological studies to assess our patients.

Results

From the original 48 patients (59 shoulders) there were 38 patients (41 shoulders) available for review.

Preoperative UCLA score was 7.9, with preoperative pain (VAS) and function scores measuring 13.1 and 1.7 respectively. Preoperative Active Forward Flexion averaged 30-45°. Postoperatively, UCLA score increased to 23.5, Pain and Function scores were 6.8 and 5.6 respectively. Active Forward Flexion improved significantly to an average of 65°. The mean active external rotation improved to 44° with the arm at the side compared to the 36° reported by Cofield. Patients were satisfied with the pain relief provided despite the rather poor results in function and responded that they would undergo the surgery again. Constant scores averaged 52% (unadjusted). Excellent pain relief was achieved with an average score of 1.2 (VAS). Only 13 x-rays were available for final review. No cases of humeral component loosening were noted. Superior positioning of the prosthesis was noted in all x-rays, representing the cuff deficient shoulder and there was no medial notching on the proximal humerus due to the offset built into the prosthesis. Two cases of mild heterotopic ossification were seen and head-shell motion was preserved in >60% of patients.

There were 8 postoperative complications. Two early complications included an acromial fracture and an ulnar nerve neuropraxia, both of them resolved favorably. There were six late complications; two periprosthetic fractures requiring long stem revision surgeries (at 24 and 48 months post-index procedure) and four proximal-anterior subluxations, none of which required further surgery.

Discussion

This prospective study documents the mid-term results of the BiPolar shoulder arthroplasty with a minimum follow up of 5 years in patients with end-stage Rotator Cuff Arthropathy.

This study is different from the previously publicized literature ,but there are some features in its design that allow some conclusions and opinions to be made: 1)Single Operating surgeon, 2)Consistent operating team, 3)Single institution, 4)Unchanged prosthetic design, 5)Single surgical technique, 6)Single investigator, 7)Prospective follow up of patients, 8)Large number and longer follow up of patients, 9)Low percentage of patients lost to follow up.

It is not unreasonable to suggest at this stage that humeral head replacement alone is a preferable option to glenoid resurfacing,^{2,3,24-28} given the issues of glenoid bone stock deficiency, the unopposed shear forces of the deltoid and the reduction of the glenohumeral joint compression forces secondary to cuff deficiency, all contributing to potential glenoid component failure or lack of necessity.^{3,10,46} There are papers that differ from this opinion;^{29,30} however, the issue for our purposes becomes one of hemiarthroplasty versus BiPolar arthroplasty. The theories behind the BiPolar with the issues of increased lateral offset, improved lever arm for deltoid function, the birotational nature of the head for the purpose of stability and distribution of joint forces are theoretically sound and should translate into improved clinical results.^{1,13,14,15} What we have found is that the durable clinical findings of pain relief and patient satisfaction,

combined with survival longevity of the implant are consistent and compare favorably with hemiarthroplasty.

With the alternative options of joint debridement, Arthrodesis, resection arthroplasty, hemiarthroplasty or total shoulder replacement with increased constraint,^{3,6,22,25,32,33} combined with the potential complexities of glenoid component loosening, the BiPolar arthroplasty is a viable option providing relief of pain, high patient satisfaction and a 93% probability of survival of the implant at 10 years in those selected patients, with painful end-stage glenohumeral rotator cuff arthropathy.

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