Use of Custom Glenoid Components for Reverse Total Shoulder Arthroplasty

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INTRODUCTION: Severe glenoid bone loss in reverse total shoulder arthroplasty (RTSA) presents substantial challenges, with high failure rates with bone grafting. Custom glenoid components have been reported to be a viable solution for those with large bone defects. However, the strengths and limitations of using these implants have not previously been described. The purpose of the present study was to evaluate short-term clinical and radiographic outcomes after RTSA using a custom glenoid baseplate and to report the benefits and short-term complications associated with the use of these implants.

METHODS: This is a retrospective case series from a single institution of 29 patients for whom a custom glenoid component was created between 2017 and 2022 for extensive glenoid bone loss. Of these patients, 3 became too sick for surgery, 1 died before surgery could be performed, and 25 were studied retrospectively between 1 and 51 months, with 9 having a minimum of 2-year follow up. Of the 25 patients, 10 had primary arthroplasties and 15 had revision arthroplasties. Patients were evaluated preoperatively and at 10 days, 6 weeks, 3 months, 6 months 1 year, and yearly for up to 5 years. All patients received preoperative physical examination; plain radiographs, including a true anterior-posterior view and axillary view; and computed tomography (CT). All had preoperative planning using a proprietary system, with creation of the custom implant in conjunction with engineers from the manufacturer. Patient-reported outcome measures were recorded preoperatively for all patients and repeated at 1 and 2 years postoperatively. All intraoperative and postoperative complications were reported.

RESULTS: Of the 25 patients who underwent the procedure, a custom implant was unable to be matched in 3, and were instead treated with eccentric reaming and placement of standard RTSA components. Eccentric reaming was not possible in a 4th patient, so the custom implant was placed despite not having complete seating in the glenoid. For these 4 patients, the length of time from CT scan to implantation of their respective glenoid components averaged 7.6 months (range 6.1–10.7 months), compared with 5.5 months (range 1–10.7 months) for those implanted with no difficulty. There were 7 intraoperative complications: 5 greater tuberosity fractures, 1 proximal acromial fracture, and 1 medial calcar fracture of the proximal humeral shaft treated with Dall-Miles cables. In 8 patients (32%) the central screw did not provide compression, but none of these had failed at the most recent follow up. There was no failure of the glenoid component in any patient, including the 9 with at least 2-year follow up; in all patients with a minimum of 2-year follow up, there were statistically significant and minimal clinically important difference changes from preoperatively to postoperatively in visual analog scale score for pain, all patient-reported outcome measures, and range of motion in abduction and internal rotation up the back.

DISCUSSION AND CONCLUSION: Custom glenoid components show promise in the treatment of substantial glenoid bone loss but are not without challenges. This study showed that a prolonged time of >6 months from CT scan to device implantation resulted in bone loss that rendered the implants unusable. When the device does fit the glenoid, satisfactory short-term radiographic and clinical follow up at a minimum of 2 years can be achieved.