

# HIGH DEMAND 3D-PRINTED CUSTOM MADE SHOULDER PROSTHESIS RECONSTRUCTION AFTER TIKHOFF-LINBERG RESECTION

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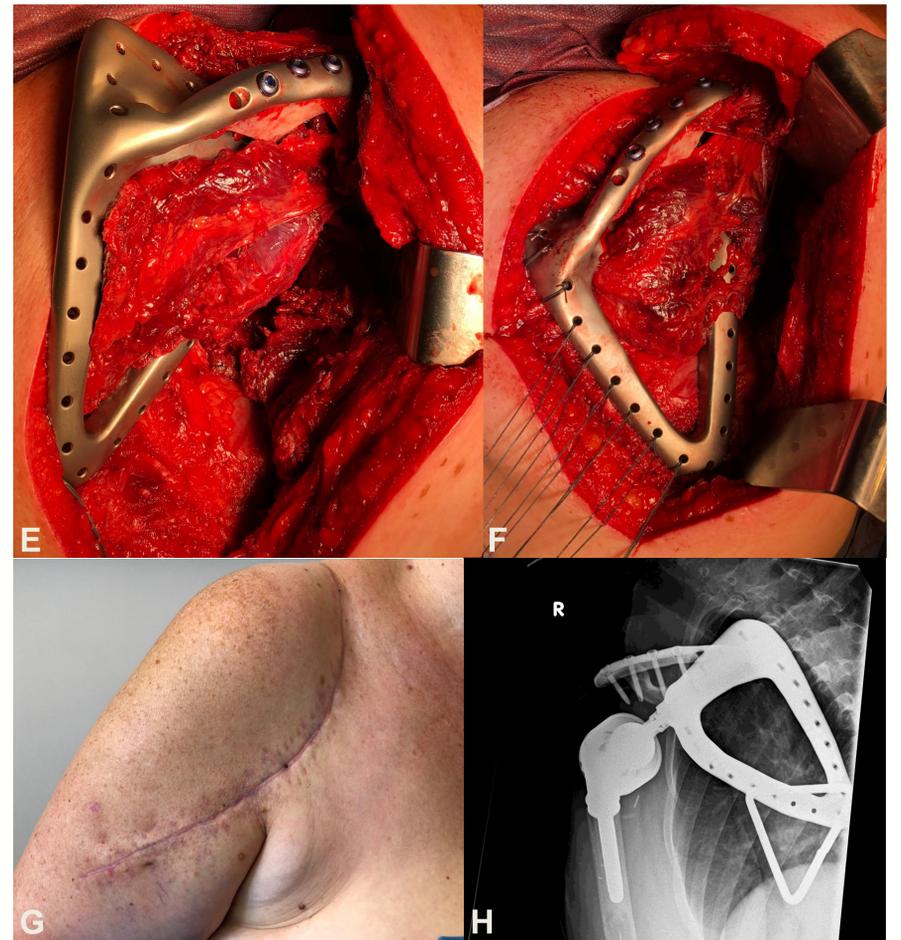
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## INTRODUCTION

Extra-articular scapulo-humeral resection is rarely indicated, and is associated with advanced tumor disease around the shoulder. This surgical procedure usually does not allow for high functional expectations because the shoulder joint is completely resected. The function mainly depends on the integrity of the deltoid abduction mechanism, specifically the axillary nerve and the roof of the acromion which –if not resected for tumor purposes- usually is osteotomized at the scapular spine. However, even if both these structures can be saved, there is usually no good solution to fix the scapular spine (together with the acromion and the deltoid origin), which is mandatory for good shoulder function.

## PATIENT & METHODS

We report on a 55 year old female who presented with a 15cm lump of the anterior shoulder and scapula (A). Imaging showed the mass originating from the scapula, invading the shoulder joint (C). A MR-neurography showed the axillary nerve on the tumor, and the scapular spine free of tumor. Biopsy revealed a chondrosarcoma G2. Because the patient wanted to preserve as much function as only possible, we elected to 3D-print a custom-made prosthesis with an integrated plate allowing for osteosynthesis of the scapular spine to the prosthesis, together with the deltoid insertion (B-D).



## RESULTS

After extra-articular resection of the entire scapula and the proximal humerus, we stimulated again the axillary nerve to ensure its function. First, we inserted the uncemented humeral stem. Then, we freed up the scapular spine such that we could fit the 3D-printed drilling guide to place the optimal angle of the screw holes into the scapular spine. The 3D-printed custom-made prosthesis was then brought into the situs and the plate was then easily fixed using the predrilled holes of the scapular spine. The reverse designed prosthesis was then assembled and the scapular body of the prosthesis brought in (E-F). Then, the remainder of the trapezius, the rhomboid, levator, latissimus and teres major muscles were sewed to the prosthesis. The arm was immobilized onto an abduction splint for six weeks, when passive range of motion was started. At 3 months, active ROM was begun. There were no complications, specifically no signs of infection (G-H).

## CONCLUSION

3D-printed custom made prosthesis may represent an option to shoulder reconstruction after Tikhoff-Linberg resection, provided the axillary as well as the deltoid origin can be preserved. The costs need to be carefully weighed against the potential devastating complications.

## HIGHLIGHTS:

If the axillary nerve and the deltoid insertion can be safed, 3D-printed prosthetic reconstruction may provide a viable option after Tikhoff-Linberg resection.

