Total Humeral Endoprosthetic Reconstruction: A Systematic Review

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INTRODUCTION:
Total Humeral Endoprosthetic Reconstruction (THER) is a rare procedure most commonly utilized in the treatment of large humeral neoplasms. Due to the limited data concerning total limb salvage procedures, this study reviewed the current knowledge surrounding THER and evaluated its outcomes including functionality, complications, and revisions.

METHODS:
A review of 30 publications with a total of 175 patients undergoing THER between 1969-2023 was performed without restrictions. Patients with non-expandable total humeral prosthesis were isolated and analyzed for outcomes, complications, and implant survival rate. Expandable prosthesis and skeletally immature patients were excluded.

RESULTS SECTION:
Of 29 studies, the most common indication was neoplasm (n=25, 86%) with osteosarcoma represented in 21 studies (72%). The remaining patients underwent THER as a salvage procedure for advanced rheumatic (n=3, 10%) or hydatid disease (n=1, 3%). The mean follow-up was 61.98 months (SD = 55.25) among 19 studies and a mean Musculoskeletal Tumor Society score (MSTS) was 73.64% (SD = 10.69) among 12 studies. In 7 studies, local recurrence occurred in 19 THER patients with 6 requiring amputations and 6 expiring from disease progression. Reported complications included 24 primary revisions in 6 studies, 35 cases of shoulder instability in 7 studies, and 13 cases of deep infections in 4 studies. 22 sources discerned that patients undergoing THER or a proximal humeral replacement had limited shoulder motion with greater passive than active movement, however elbow and hand motion was generally preserved.

DISCUSSION:
THER should be considered in the orthopedic oncologist's armamentarium, equipped with a thorough knowledge of outcomes to guide patient and clinician expectations. This may further stand as a benchmark as we trend towards wider adoption of modular implants or rapid prototyping technology to improve accessibility and postoperative function of this otherwise uncommon reconstructive method.

SIGNIFICANCE/CLINICAL RELEVANCE:
Total humeral endoprosthetic replacement, or THER, is a rare limb salvage option most commonly used as an alternative to amputation or disarticulation procedures when saving the native joints at either end is no longer possible. This study demonstrates that when used for oncologic or nononcologic purposes, it remains a clinically relevant procedure for orthopedists wishing to salvage a limb, minimize complications, or maintain elbow and hand motion.

IMAGES AND TABLES:

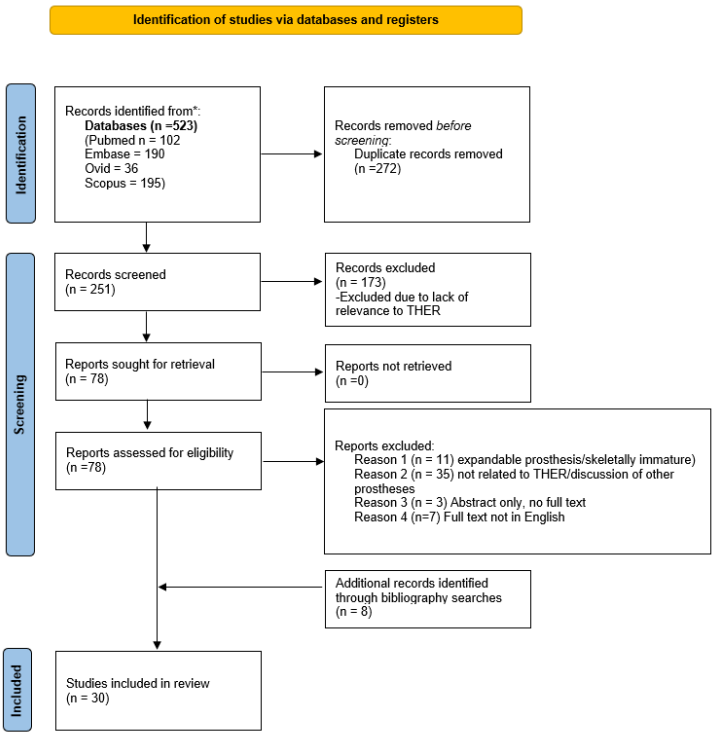

Figure 1: PRISMA flow diagram detailing the systematic review process

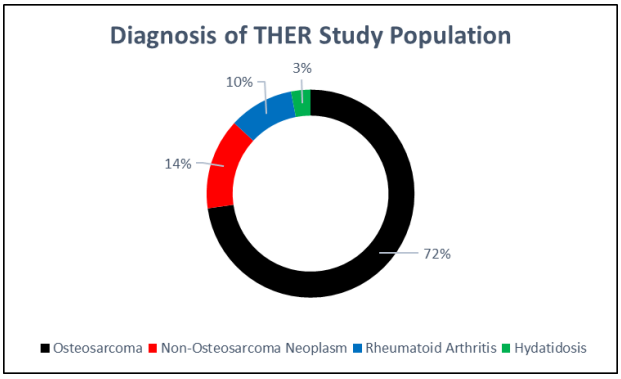

Figure 2: Diagnosis of THER Study Population

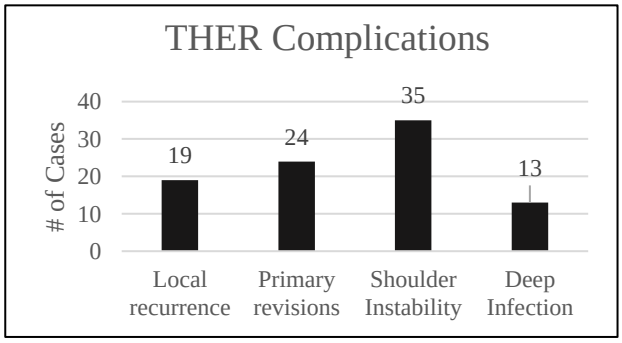

Figure 3: THER complication case counts