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**Factors associated with infection after reconstructive shoulder surgery for proximal humerus tumors.**

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**Background:** The proximal humerus is a common site for primary malignant and benign locally aggressive bone tumors as well as for metastatic disease. The main categories of reconstruction include shoulder arthrodesis and functional or mobile reconstruction with osteoarticular allografts (OA), endoprotheses (EP) or allograft-prosthesis composites (APC). Advocates of endoprosthetic reconstruction argue infection and allograft fractures to be frequent with allograft use.

**Questions/Purposes:** The purpose of this retrospective study was to (1) identify differences in terms of infection rate between mobile reconstructive techniques (2) identify predictors of infection that may be modifiable and (3) to describe characteristics, clinical course, and a protocol of treatment in patients with infection after oncologic reconstructive shoulder surgery.

**Patients and Methods:** We reviewed 150 patients of all ages with proximal humerus primary or metastatic tumors treated with reconstructive surgery at two tertiary referring hospitals.

Multivariable Cox regression analysis was used to identify pre, peri and post-operative clinical and laboratory factors independently associated with acute, subacute or chronic infection of superficial or deep involvement.

**Results:** Nineteen patients (13%) developed an infection after reconstructive surgery of which nine were superficial and ten were deep infections. There were no differences between reconstruction modalities in terms of infection rates: OA: 11% (5/45); EP: 14% (12/85) and APC: 10% (2/20). Patients with low pre-operative hemoglobin ( $p = 0.041$ ), low pre-operative albumin ( $p = 0.043$ ), positive resection margin ( $p = 0.020$ ), and low post-operative hemoglobin blood level ( $p = 0.048$ ) were associated with infection after proximal humerus reconstruction surgery. In multivariable analysis, the only factor independently associated with infection was lower pre-operative hemoglobin (HR 2.0, 95% CI 1.1 – 3.9,  $p = 0.018$ ). In sub analyses younger age ( $p = 0.030$ ) was associated with deep infection and low pre-operative albumin ( $p = 0.019$ ) was independently associated with superficial infection.

**Conclusions:** The use of osteoarticular allografts does not increase the risk of infection in oncologic reconstruction of the proximal humerus. Nutritional and medical optimization of patients pre-operatively, reflected by albumin and hemoglobin, is necessary to decrease the risk of deep and superficial infection in this patient population. Superficial infection can be successfully controlled with early and aggressive irrigation debridement to avoid progression to deep infection. Once deep infection occurs, two-staged revision with antibiotic spacer and antibiotics IV for 6 to 8 weeks with subsequent infection provides a high success rate.