

Peer Review File

Article information: <https://dx.doi.org/10.21037/aoj-20-101>

Comment 1: In the abstract, "The humerus is the second most common site for bony metastatic lesions." This is not an appropriate expression because spine, pelvis and femur were considered the most popular metastatic sites in various cancers. Please specify long bone or appendicular bone.

Reply 1: We agree. This is a holdover from a previous iteration. We will revise.

Change in text: "The humerus is a common site of bony metastatic lesions."

Comment 2: Page 4, last line, the author mentioned "patients with less than six months follow-up were excluded," which is a conflict with the follow-up duration mentioned on page 5, line 21 (0.1 – 110 months). The fact is that a certain portion of metastatic bone patients has a relatively short expected survival. Even though estimated survival is less than six months, surgical management is worthy of for pain relief and improved life quality.

Reply 2: That is a failure to adequately explain our inclusion criteria. We included patients who died or were discharged to hospice sooner than 6 months as well. I have revised both sentences explaining inclusion and exclusion criteria to make this clearer.

Change in text: "Patients were included if they had a pathologically confirmed metastatic lesion between the surgical neck and 3cm proximal to the olecranon fossa, if the fracture pattern was amenable to both implant options, if appropriate cost data was available and if they had at least six months of follow up or died and/or were discharged to hospice sooner than 6 months. Patients were excluded if metastases were suspected but not confirmed, if the fracture was not amenable to both implants, if treated with a surgery other than osteosynthesis, if insufficient data was available or if they were alive but had less than 6 months of post-operative follow-up."

Comment 3: The author should explain why the estimated OR cost is superior to the actual OR costs of each patient included. By using the estimated OR cost, longer OR time means more OR costs and contributes to the analysis's significance...i.e.

Reply 3: We did not think it would be feasible to specifically isolate the specific contribution of implant choice to the actual OR costs. OR costs vary between institutions making a direct comparison between two different facilities difficult. Patient insurance status and specific carrier contribute to variations in billing. Factors not associated with the neither the implant nor the surgery such as foley placement, prolonged intubation or extubation or PACU holds—to name a few—also contribute to actual OR cost. We attempted to estimate the OR costs attributable specifically to the implant choice. One may argue that surgeon billing would also play a role. If the surgery were prophylactic as it was in 47.5% of patients without a displaced fracture, the CPT and thus the RVU weight is the same for plating versus nailing. For displaced fractures, the RVU difference based on the 2021 CMS guidelines between plating (CPT 24515) and nailing (24516) is only 0.07 RVUs, or \$3.50 based on \$50/RVU.

Change in text: Page 11: Fourth, our cost analysis does not utilize actual OR costs. Given the significant intraoperative variability from case to case that is unrelated to implant cost—prolonged intubation or extubation, use of a foley, nerve block placement, recovery room delays to name a few—the authors thought this would confound any differences observed in cost. Similarly, surgeon cost was immaterial. The CPT code is the same for prophylactic fixation as would have been billed for patients without a displaced fracture. For displaced pathologic fractures, the RVU difference between plate fixation (CPT 24515) and nail fixation (CPT 24516) is only 0.07 according to the 2021 CMS guidelines, i.e. a difference of only \$3.50 assuming \$50/RVU. Overall, the authors selected the variables thought to most directly reflect the cost contributions from the implant choice itself.

Comment 4: The author should statistically confirm the imbalance of cases among the two groups did not render the comparison. There were only 29 cases in the IM group and less than half of the plate group.

Reply 4: Authors are unaware of a separate statistical test to show that 72 and 29 are different numbers of patients apart from the statistical tests utilized as described in our methods sections. We accounted for small sample sizes and unevenly distributed data where appropriate.

Change in text: None made

Comment 5: Please specify the indication of IMN vs plating, is this based on the size of the lesion, or just a surgeon's preference. Other baseline demographic data should be included in the analysis, like ECOG score, visceral metastasis.

Reply 5: As for implant selection, this is based on surgeon preference, which heavily weights toward plate fixation at VUMC and toward nail fixation at U Penn. As far as the baseline demographic data, ECOG scores are not routinely recorded by either department nor are they readily available in the chart. Given the retrospective nature of this study, the subjective nature of ECOG scores and the high mortality rate, it would not be possible to obtain them from patients after the fact. This would also change the nature of the investigation. While ECOG status and visceral metastases may play a role in whether or not a patient elects to have surgery, once surgical intervention is decided upon, the specific implant choice is decided based on surgeon preference accordingly to the lesion and fracture characteristics. The authors do not believe these factors significantly effect implant choice.

Change in text: Page 6, line 3 “Choice of implant was based on surgeon preference.”

Comment 6: The shorter OR time and less blood loss in the nailing group may be due to the surgical procedure's nature, which is not directly involving with the lesion itself. The smaller tumor volume in the nailing group also contributes to this result.

Reply 6: We agree that the difference in technique between nailing and plating contributes to the difference in OR time but that lesion size may also be a confounder.

Change in text: Page 8-9, “The authors believe this difference to be due predominantly to the difference in surgical technique between plating and nailing, but this is confounded by the statistically significant increased linear size of the metastatic lesions in the plate group. Despite this confounder, the effect sizes for both EBL and operative time—289mL and 71 minutes respectively—are large enough that they are unlikely to be solely attributable to lesion size.”

Comment 7: The author should strictly follow the formatting requirements from the journal, especially for tables and citations.

Reply 7: This is noted. We have changed the citation list accordingly.

Comment 8: The abstract is wordy and needs to be streamlined.

Reply 8: Noted

Change in text: Entire abstract streamlined.