ISAKOS

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

11th Biennial ISAKOS Congress • June 4-8, 2017 • Shanghai, China

Paper #197

Resource Utilization After Surgery for End-Stage Ankle Arthritis: Comparison Between Ankle Replacement, Open and Arthroscopic Ankle Fusion

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Summary:
Resource utilization is lower for arthroscopic ankle fusion versus open ankle fusion or total ankle arthroplasty

Abstract:
Introduction
Arthroscopic techniques for ankle arthrodesis have more recently been developed, although there has been limited research exploring the cost of arthroscopic (AAA) versus open ankle arthrodesis (OAA), and comparing ankle fusions to replacement (TAA). We hypothesize that resource use after AAA will be lower than that after OAA, and both will be lower than TAA.
Methods
We performed a retrospective review of a prospectively collected database. Patients with >2 years of follow up who had undergone AAA, OAA or Hintegra TAA at a single institution between 2003-2010. Ninety patients with TAA, 52 with AAA and 56 with OAA met our inclusion criteria. For resource utilization we measured number of post-operative clinic visits, initial OR time and OR time for re-operations, initial length of stay (LOS) and length of stay for additional hospital admissions.
To compare the resource utilization outcomes among the groups, we performed multivariable gamma regression model and negative binomial regression model with a random intercept to accounting for clustering by surgeon. Models were adjusted for preselected confounding variables.
Results
When taking into account of both initial surgery and post procedure, AAA had the lowest number of clinical visits among the three groups, [AAA vs. TAA (ratio of event rate = 0.39; 95%CI of 0.29, 0.51 p<0.0001); AAA vs. OAA (ratio of event rate = 0.66; 95%CI of 0.49, 0.89 p=0.01)]. OAA was ranked at the second lowest position [OAA vs. TAA (ratio of event rate = 0.58; 95%CI of 0.44, 0.78 p=0.0003)]. Similar results were found for total LOS. AAA had significantly shorter LOS than TAA (ratio of event rate = 0.35; 95%CI of 0.24, 0.49 p<0.0001) and OAA (ratio of event rate = 0.60; 95%CI of 0.42, 0.86, p=0.01). Again, OAA had less LOS than TAA (ratio of event rate = 0.58; 95%CI of 0.42, 0.80 p=0.001). In term of OR time, while AAA required less time among the three groups [AAA vs. TAA (ratio of event rate = 0.62; 95%CI of 0.45, 0.86 p=0.004); AAA vs. OAA (ratio of event rate = 0.66; 95%CI of 0.47, 0.94 p=0.02)], no statistical significant difference was found between OAA and TAA (ratio of event rate = 0.93; 95%CI of 0.67, 1.29 p=0.67). When examining OR for only the post-procedure, no significant different was found among the three groups. For the post-procedure LOS, comparing with TAA, the other two groups required shorter hospital stay [AAA vs. TAA (ratio of event rate = 0.01; 95%CI of 0.002, 0.09; p<0.0001); OAA vs. TAA (ratio of event rate = 0.01; 95%CI of 0.001, 0.12; p=0.0003)], whereas no difference was found between AAA and OAA (ratio of event rate = 1.21; 95%CI of 14.04, 0.89 p=0.88).
Conclusion

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Using several measures of resource use, we find that arthroscopic ankle fusions compare favourably to both ankle replacements and open ankle fusions. We also show that resource use measurements can be a useful surrogate for complications, and that resource use can demonstrate the practical implications of complications of patients, surgeons and health care resources.