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Reviewed by 00724252

Q: “This study was to evaluate the economic impact of minimally invasive LUMBAR SURGERY👍. The authors thoroughly reviewed the cost effectiveness according to various spinal procedures. I’d like to recommend you to publish this study.”

R: “We thank the reviewer for reviewing our manuscript and his positive conclusion.”

Reviewed by 00506224

Q: “1. The manuscript can be more concise. Its focus should be on the economic perspective. There are many sections where the authors discuss a particular procedure describing radiographic and clinical outcomes as well as complications in extensive detail. This occurs in all sections but most prominently in the section on deformity. While a brief description is warranted to explain the potential economic benefit of a minimally invasive approach for deformity correction given the lack of cost effectiveness studies on MIS deformity, the discussion should just highlight the main points.”

R: ” We greatly appreciate the reviewers comment. The manuscript was thoroughly revised and all sections and in particular the section on deformity was shortened. Given the lack literature reporting on direct economic comparison of standard open vs. minimally invasive lumbar spine

procedures, we include data regarding clinical outcome and complications. Demonstrating equivalent or superior clinical outcomes and perioperative morbidity of minimally invasive procedures compared to standard procedures constitutes the very foundation for future economic comparisons. However, we very much agree with the reviewer that there is a lack of high quality cost effectiveness studies. In agreement with the reviewer we have also added a sentence in the conclusion pointing out the current lack of economic studies which directly compare open vs. MIS procedures: “Our current study identifies a great need for high quality cost-effectiveness studies comparing standard open lumbar spine surgeries with MIS techniques.”

Q: “2. A table detailing the studies with cost effectiveness data would be helpful.”

R: “We agree with the reviewer that a table detailing studies providing cost effectiveness data would be helpful and valuable. However, at the current time there is a lack of studies evaluating the cost effectiveness of MIS techniques. Only a few studies exist that provide such data {Parker, 2013 #152; Wang, 2010 #95}. Given the paucity of studies and the lack of standardized economic data we have to defer to future report to tabularize data. In order, to provide a more concise overview of available cost effectiveness studies we have thoroughly revised and shortened the manuscript. In order to be consistent with the reviewer we express the need for further high quality cost-effectiveness studies comparing standard open lumbar spine surgeries with MIS techniques in our final conclusion. We

agree with the reviewer that once these data are available a systematic review or meta-analysis would be interesting. “

Q: “3. In the section on short segment fusion discussing the Fritzell (citation 56) study. It is written that lumbar fusion was associated with greater direct costs. “However, since the indirect costs were similar in both groups, the total costs were similar.” This seems to be an error because if the direct cost is higher in one group and the indirect cost are similar in both groups, the total costs should be different. Please explain. “

R: ” We thank the reviewer for pointing out this discrepancy. The reason for the difference in direct cost was an unusually high rate of instrumentation removal in the fusion group. While the average total costs were on higher in the fusion group this difference did not reach statistical significance. Moreover, the difference was eliminated by excluding costs caused by reoperations. Thus, the authors conclude that the cost-effectiveness is similar for both procedures within a 2-year time frame. The paragraph was revised accordingly: “Fritzell and colleagues performed a cost-effectiveness analysis based on data from a 2-year randomized controlled trial [56]. They compared lumbar arthrodesis with arthroplasty in patients with discogenic low back pain. Both cohorts experienced similar improvements in quality of life 2 years following the procedure (0.45 QALY). This study found that lumbar fusion was associated with significant greater hospital and total healthcare costs. This was due to a higher rate of reoperations following lumbar arthrodesis (36%) compared to arthroplasty (10%). However, the gross majority of re-operations (77%) in the arthrodesis group were performed for implant removal as the implant was determined by the

surgeon to act as pain generator. The authors also included an analysis with costs for re-operation removed from both groups, which eliminated the cost difference from the perspective of both the hospital and healthcare sector. After 2- years there a nonsignificant cost difference of combined indirect and direct costs of lumbar arthroplasty compared to lumbar arthrodesis surgery. Thus, the authors concluded that both procedures were equally cost effective for society within a 2-year time frame.”

Q: “4. In the second to the last paragraph in the section on deformity beginning with “Wang and colleagues surveyed 3 “, the citation listed (77) is incorrect. Please change.”

R: ”Thank you for pointing this out. The reference was corrected.”

Q: "5. In last sentence of the conclusion, stating the MIS ASD “will play a major role” is too strong a statement at this point in time based on the data to date. I would recommend changing to “will potentially play a major role”.

R: “We are thankful for pointing out this potentially too strong statement at this point in time and with the currently and based on the currently available literature. Therefore, we agree with the reviewer and changed the sentence to: “MIS ASD surgery is currently evolving and will potentially play a major role to make adult deformity surgery economically feasible in our aging society.”

Reviewed by 00503838

“This is an interesting manuscript about the economic impact of minimally invasive LUMBAR SURGERY”👍

R: “We thank the reviewer for assessing our manuscript and his positive conclusion.”