Author's response to reviews

Title: Measurement of intraoperative Blood loss in different Stages of Scoliosis Surgery- A Prospective Study in 44 Patients

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Version: 2 Date: 11 April 2010

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Reviewer: Jonathan Spilsbury

Reviewer's report:

1) The English does not read well- i would gladly help by scanning and sending my hand written corrections

Answer: we tried to correct language mistakes during revision; however, we would be obliged by your help if you still feel some more corrections.

2) I am concerned that so much can be assumed from a small group and need statistical help.

Answer: Per-level EBL and operative time was calculated exactly at each stage and all calculations were performed by statistical analysis. So we think this study would be important to the researchers who are related with the clinical research.

3) They have observed the trend of more bleeding in paralytic neuromuscular (mainly DMD) and concluded that the bleeding was worst in the correction phase, due to bone-screw interface loosening- but there is no comment on how many screws dragged in the correction phase- without this information this conclusion is, i believe, not valied

Answer: this was our observation during the study. However, we cannot confirm the numbers of screws that actually loosened during the correction procedure. We think at this stage producing data would be a biased observation. We have clarified in the discussion. Additionally we think measuring EBL during different stages of operation is also a new finding that can guide surgeon where should we be aware of bleeding.

4) The conclusion that increased bone density preop will lead to reduced bleeding has not been proved by this paper- it is speculation and needs to be presented as such
Answer: we agree to your comment that role of preoperative increase in BMD in reducing intraoperative decrease in EBL cannot be validated from this study. We have included this clarification in discussion. We also added that to validate it, further study is warranted.

5) I do not understand the comments on page 11 re CP 15% etc

Answer: as per previously published study, in CP patient blood loss is related to altered blood parameters, such as clotting time etc. If intraoperative blood loss exceeds 15% of total blood volume, it causes change in blood parameters and thus increasing EBL. However, in our study we found more blood loss in screw insertion stage and at that time blood loss was less than 15% of total blood volume. Additionally, bone-grafting stage also has lower EBL which doesn’t support their theory. We have included it in revision.

Quality of written English: Not suitable for publication unless extensively edited.

Answer: we have tried to edit English language as per the best of our ability.

Reviewer: Frank Schwab

Reviewer’s report:

The subject of blood loss is clearly important. The authors set out to study the phases of surgery and EBL. The intent is to more closely understand parameters tied to EBL and assess which portions of surgery differentiate paediatric scoliosis patients. Unfortunately, this study compares very different populations of patients given the varied types of deformities and medical co-morbidities.

Some points to consider:

1. Stiffness of the curves impacts complexity of screw placement this will impact particularly the EBL during screw placement and correction portions of surgery as this paper shows.

Answer: we have added stiffness of the curve in different pathology by preoperative flexibility radiogram. Average preoperative flexibility in group 1, group 2 and group 3 was 41.3±9.1%, 41±11.3% and 46.8±9.1%, respectively. By comparing preoperative flexibility using ANOVA test, it did not show any statistical difference (p=0.21). Therefore we do not think that preoperative flexibility has affected EBL in this study.

2. BMI and soft tissue distribution may be important but was not studies. This may have an impact given soft tissue bleeding and difficulty in retraction/exposure and closing.

Answer: we agree with the comment. However, we strictly took care to control bleeding from soft tissue during the dissection part. However, we cannot rule out its role. We have included discussion on this part as well.
3. Iliac fixation and exact levels fused were not compared. There is a big difference between fusing 10 thoracic levels vs. 10 levels extending down to the pelvis with iliac anchorage.

Answer: we agree that there may be some difference in fixing the screw between thoracic and lumbar level or iliac level. Therefore we have measured operation time for each level which was similar for each level and thus it justified the screw insertion at different level. Additionally if dissection is ok, inserting screw at different level does not make any difference practically.

4. BMD may be important regarding EBL but can’t that be easily solved with floseal injection into screw holes as is commonly done at many institutions?

Answer: as a part of this study, we did not use floseal to stop bleeding during the surgery. We of course tried to control it with bone wax, gelfoam and surgical. Additionally using flowseal to stop bleeding from the screw-bone interface is difficult.

5. I am not certain one can conclude that BMD is the critical link to EBL given that the populations are so different in many ways: pathology, deformity stiffness, systemic factors of paralytic patients etc…

Answer: this study mainly presents different pattern of blood loss in different pathology as a major part; and it produce a possible link with BMD status as a minor part. We have clarified this in discussion. Therefore we think to prove this link further studies are necessary. We additionally did not deny about other factors that play role in intraoperative bleeding. We present BMD as one of the additional factor for EBL.

6. the conclusion that bone density should be improve pre-op is of limited value given that in non-ambulatory NM/paralytic deformities bone density is very difficult to change.

Answer: we mentioned in discussion part that improving BMD and its relationship with reducing EBL needs further prospective studies to validate it. We agree that this study cannot validate it.

Reviewer: Teresa Bas

Reviewer’s report:

This paper raises a very interesting question. The blood loss is a major problem in surgery of deformities. The authors noted that patients with t score <2.5 have a higher risk of bleeding. However, they do not provide a solution.

Answer: we have written a possible solution by raising BMD value if preoperative BMD is less than 2.5. However, we did not study it in our patient group, so it is not possible to comment on it definitively.

GENERAL POINTS
1. Are the groups 2 and 3 treated with antifibrinolytics agents to prevent intraoperative bleeding?

Answer: no, in this study we did not treat any patient by antifibrinolytic agent such as floseal. However, we used surgicell, bone wax and gelfoam to control bleeding.

2. How the blood loss is estimated?

The estimated blood loss (EBL) was based on the use of the blood loss in the suction container (accounting for irrigation used on the surgical field) plus the blood loss estimated from the difference in weights of dry and blood soaked sponges. This measurement was based on previously published literature.

3. What is the molecular explanation to relate poor bone quality and a higher risk of increasing blood loss?

Answer: we have presented that there is a possible correlation that poor bone quality has higher risk of increasing blood loss from our study. Additionally we have shown different pattern of blood loss during different stage of surgery which is main finding of this study. We did not evaluated it by microscopically to explain it about molecular basis. We apologize for that.

4. How was calculated the number of patients require to have statistical significance?

Answer: we have compared our results with proper statistical analysis and p value was kept 0.05 to be considered as statistically significant.

Conclusions: The work is well structured and identifies another possible cause of intraoperative bleeding. It should be comment if treatment for improving BMD preoperatively can decrease the risk of bleeding. The authors should answers the comments raised above.

Answer: In last paragraph of discussion we mentioned that this study could not validate reduction in EBL by improving preoperative BMD. However, further prospective studies are warranted to validate it.