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Comment on: “Do maternal albumin levels affect post-operative complications after cesarean delivery?”

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Abstract

Hypoalbuminemia is often considered an independent risk factor for surgical site infections. This study first demonstrated that albumin level ≥ 3.3 g/dL was independently associated with adverse maternal outcomes. In this letter to the editor, we would like to raise some concerns about the study and clarify the interpretation of the results.

Keywords Serum albumin, Cesarean delivery, Postoperative outcome, Surgical site infection

Main text

Surgical site infection (SSI) is a major cause of prolonged hospital stay and a burden to the healthcare system [1, 2]. Maternal SSI after cesarean delivery is a clinical problem that contributes to significant morbidity and mortality rates. We read with great interest the study by Yagur et al., who published a retrospective cohort study, the first to analyze the relationship between maternal serum albumin levels before elective cesarean delivery (CD) and postoperative complications [3]. The results suggested that high serum albumin levels among women undergoing CD might be associated with abnormal postoperative outcomes. However, the results of the study were unexpected; based on these results, it can be hypothesized that changes in serum albumin level, especially increases from the normal range, may affect maternal pregnancy outcomes.

In this retrospective cohort study, many risk factors for SSI were included, However, many other relevant variables likely were not measured. Since both groups differed significantly across measured variables at admission, it is likely that unmeasured variables were similarly unbalanced. We think it is too early to come to the conclusion and offer the following points as counter-argument.

First, in this article, parturients with preeclampsia were excluded from the study. Tran et al. [4] found that preeclampsia was an independent risk factor for SSI. Preeclampsia is often associated with hypoalbuminemia. Thus, the exclusion of women with preeclampsia may influence the results.

Second, risk factors such as surgery duration, [5] hypertension disorders, [6] and blood transfusion during CD were not included. Prolonged operative time has been shown to increase the risk of SSI [7]. Furthermore, hypertensive disorder is an independent risk factor for wound infection after CD [6]. In a hospital-based case-control study, blood transfusion during or following delivery, was shown to be an independent risk factor for SSI [8]. Mazzeffi et al. declared that RBC transfusion may

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be associated with increased risk for organ space SSI and septic shock after colon resection surgery [9].

Third, obesity, especially pregestational obesity, as a potential risk for post-CD wound infection has been discussed previously [4–6, 10–12]. Maternal obesity (body mass index (BMI) ≥ 30 kg/m²) was significantly linked to an increased incidence of SSI. While pregestational BMI was not included in the article, delivery BMI was divided into BMI < 25 kg/m² and BMI ≥ 25 kg/m². Thus, the proportion of BMI > 30 kg/m² was not compared between the two groups. Furthermore, other factors such as incision length > 16.6 cm [10] and subcutaneous tissue thickness > 3 cm, [13] that have a great effect on the risk of developing SSI were not considered. Diabetes mellitus was included in this study, but it was unclear whether this was gestational diabetes mellitus, which could have affected the results.

Finally, we have a few concerns regarding the methodology of this study. First, a receiver operating characteristic (ROC) curve was generated, and a cutoff value of 3.3 g/dL was provided in this study. However, the ROC curve was not presented and neither the value of sensitivity, specificity, nor the area under the ROC curve and its 95% confidence interval were described. Secondly, the presented regression is composed of many variables, but there is no explanation why these variables were entered as no description of the groups is presented. As this study was to analyze whether high serum albumin levels among women undergoing CD affect risks of postoperative outcomes, a case-control study may be more appropriate which begins with an outcome to comprehend the cause.

In conclusion, many details about the course of deliveries are unavailable in this study. The result may only be convincing after accounting for these confounding factors. There are multiple possible causes of SSI that the study does not address.

Abbreviations

SSI	Surgical site infection
CD	cesarean section
BMI	body mass index

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Authors' contributions

Zhou S and Cao X reviewed the literature and were major contributors in writing the manuscript. Liu Z reviewed, modified, and finalized the manuscript. All authors read and approved the final manuscript.

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Competing interests

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References

1. Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. *JAMA Surg*. 2017;152(8):784–91.
2. Borchardt RA, Tzizik D. Update on surgical site infections: the new CDC guidelines. *JAAPA*. 2018;31(4):52–4.
3. Yagur Y, Ribak R, Ben Ezry E, Cohen I, Or Madar L, Kovo M, et al. Do maternal albumin levels affect post-operative complications after cesarean delivery? *BMC Pregnancy Childbirth*. 2022;22(1):909.
4. Tran TS, Jamulitrat S, Chongsuvivatwong V, Geater A. Risk factors for post-cesarean surgical site infection. *Obstet Gynecol*. 2000;95(3):367–71.
5. Opøien HK, Valbø A, Grinde-Andersen A, Walberg M. Post-cesarean surgical site infections according to CDC standards: rates and risk factors. A prospective cohort study. *Acta Obstet Gynecol Scand*. 2007;86(9):1097–102.
6. Schneid-Kofman N, Sheiner E, Levy A, Holcberg G. Risk factors for wound infection following cesarean deliveries. *Int J Gynaecol Obstet*. 2005;90(1):10–5.
7. Cheng H, Chen BP-H, Soleas IM, Ferko NC, Cameron CG, Hinoul P. Prolonged operative duration increases risk of Surgical Site Infections: a systematic review. *Surg Infect (Larchmt)*. 2017;18(6):722–35.
8. Kvalvik SA, Rasmussen S, Thornhill HF, Baghestan E. Risk factors for surgical site infection following cesarean delivery: a hospital-based case-control study. *Acta Obstet Gynecol Scand*. 2021;100(12):2167–75.
9. Mazzeffi M, Tanaka K, Galvagno S. Red Blood Cell Transfusion and Surgical Site Infection after Colon resection surgery: a Cohort Study. *Anesth Analg*. 2017;125(4):1316–21.
10. De Vivo A, Mancuso A, Giacobbe A, Priolo AM, De Dominicis R, Maggio Savasta L. Wound length and corticosteroid administration as risk factors for surgical-site complications following cesarean section. *Acta Obstet Gynecol Scand*. 2010;89(3):355–9.
11. Wloch C, Wilson J, Lamagni T, Harrington P, Charlett A, Sheridan E. Risk factors for surgical site infection following caesarean section in England: results from a multicentre cohort study. *BJOG*. 2012;119(11):1324–33.
12. Olsen MA, Butler AM, Willers DM, Devkota P, Gross GA, Fraser VJ. Risk factors for surgical site infection after low transverse cesarean section. *Infect Control Hosp Epidemiol*. 2008;29(6).
13. Vermillion ST, Lamoutte C, Soper DE, Verdeja A. Wound infection after cesarean: effect of subcutaneous tissue thickness. *Obstet Gynecol*. 2000;95(6 Pt 1):923–6.

the first to. Analyze the relationship between maternal serum albumin levels before elective cesarean delivery (CD) and postoperative complications.

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