

ORIGINAL ARTICLE

The Charité cesarean birth: a family orientated approach of cesarean section

Robert Armbrust, Larry Hinkson, Katharina von Weizsäcker, and Wolfgang Henrich

Department of Obstetrics, Charité University Hospital, Berlin, Germany

Abstract

Objective: To evaluate the safety and patients delivery experience of the Charité Cesarean Birth (CCB), a modified cesarean section (CS). Parents are actively integrated in the delivery process by direct visualization of the birth, cutting the umbilical cord and early skin-to-skin contact (STS).

Methods: Women with an indication for a planned primary CS at term were included. Trial was conducted at the Charité University Hospital Berlin as a prospectively randomized controlled trial. Parameters of perinatal outcome for both mother and infant were assessed using modified Likert-Scales and a standardized questionnaire. Primary outcome measures were birth experience and satisfaction for parents. Parameters of breast feeding and consecutive problems. APGAR Scores, blood loss, perioperative complications were secondary outcome measures.

Results: Birth experiences were rated significantly higher in the CCB group compared to a classical caesarean section ($p < 0.05$). There were no significant differences between APGAR Scores, need for admission to an intensive care unit. Also perioperative blood loss and cardiovascular disorders did not differ between the two groups. Early STS was achieved in the 72% of the cases with higher rates of breast-feeding in the CCB group.

Conclusions: The CCB leads to a significantly better birth experience. The procedure seems to be safe for both mother and infant. Patients become an active part of the CS by direct visualization of the birth and cutting the umbilical cord. The presented modification is a useful and safe option when a CS is medically indicated and necessary. It improves the breast-feeding and the early mother-infant interaction.

Keywords

Birth experience, breast feeding, caesarean section, early-skin-to-skin contact

History

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Introduction

Cesarean section (CS) rates have increased in the recent decade in Europe and worldwide but differ widely in different countries and different health care sites [1]. In Germany, the rate has been reported as high as 31.9% [2]. The indications for CS are varied and include not only clear medical indications but there are also psychological, social and medico legal aspects which influence the decision to perform a CS [3,4]. It is suggested that in 50% of cases clear indications are reasonable whereas in 45% relative indications play a role especially in the second stage of labor (e.g. failure to progress, presumed fetal compromise) [4]. Despite not having exact figures, the rate of elective CS performed on maternal request appears to be within the range of 2–5% which, though low is significant [5]. There is however emerging evidence that women undergoing CS have a less than satisfactory overall birth experience [6,7]. In view of

these developments, the atmosphere surrounding the performance of the delivery, the technique of surgery and the procedure as a whole during CS has not significantly evolved to enhance the mother and partner experience. The main focus of research has tended to focus on the surgical technique itself and reducing associated risk factors and complications.

In many hospitals, it is routine practice that the newborn is taken by a midwife or neonatologist immediately after cutting of the umbilical cord, the baby is then examined before being introduced to the parents, often several minutes after the birth. Compared to a vaginal delivery, the baby is not given directly onto the mother to promote early skin-to-skin contact (STS). This early mother infant interaction has a positive impact of breast feeding, bonding and reduces crying. Early STS positively affects cardiorespiratory stability of the newborn and also blood glucose levels [8–10]. The first approach of modifying the CS was described in 2008 by Fisk et al. and was termed the “natural caesarean” [11]. One of the main aspects was to mimic the situation of a vaginal birth and to give parents a better birthing experience. According to this approach, the technique was modified and then introduced to the Department of Obstetrics at the Charité University

Address for correspondence: Robert Armbrust, Department of Obstetrics, Charité University Hospital, Augustenburger Platz 1, Berlin 13353, Germany. Tel: +49 (0) 30 450 664 356. E-mail: robert.armbrust@charite.de

Hospital, Berlin. The modification was named “Charité Cesarean Birth” (CCB). The main objective of the presented prospectively randomized control trial was to evaluate the safety of the procedure and also to compare parameters of the birth experience in contrast to the traditional “routine CS”.

Methods

This trial was conducted from January to July 2014 at the Charité University Hospital, Berlin and was approved by Institutional Review Board (No. EA2/112/13; date of approval September 18th, 2013)

Only patients with an absolute indication for a primary planned CS according to guidelines of the German Society for Gynaecology and Obstetrics were included (see also Table 1). Eligible patients were recruited during antenatal counselling. Eligibility criteria were therefore the mentioned indications for a primary CS, gestational age >37 weeks, patients without history of heavy peripartur bleeding, bleeding disorders or other severe known maternal morbidities and known fetal anomalies. Once informed about the main risks and complications of the planned primary CS, the randomization process was discussed. Randomization was based on a single sequence of random assignments (simple randomization 1:1, see Figure 1). On the day of the planned surgery the midwife opened a closed envelope revealing the selection for either a traditional CS or the modified CS to be performed. Overall 205 patients were included in the study. The counselling resident was blinded for the allocation to one of the two groups as well as the involved staff until the day of the surgery. Patients were blinded until the day of surgery and also statistician.

The main focus was on the assessment of patients’ satisfaction with the caesarean section and their subjective birth experience. Parameters regarding the birth experience, the expectations towards the birth, breast-feeding aspects as well as subjective parameters associated with the CS were assessed using modified Likert scales (range from 1 to 6) and were therefore primary outcome measures. Patients were separately (mother and father) interviewed with a standardized questionnaire between the second and fourth postoperative day. The questionnaire was divided into three sections: the first part ascertained sociodemographical information as well as pregnancy history and the indications for the primary CS. The second part consisted of questions regarding the birth experience, questions about the perception of the CCB, the early skin to skin contact and aspects regarding breast feeding (e.g. problems with lactation, day of lactation and importance of breast feeding). The third section assessed parameters of the surgery including blood loss, time of the operation and cardiovascular complications. Also safety for both mother

and infants was assessed: Secondary outcome parameters were therefore the safety of the intervention measured by the APGAR Score, umbilical cord blood gas analysis, perioperative blood loss, duration of the procedure and all other mentioned complications (e.g. cardiovascular disorders, problems of the attending partner).

The exclusion criteria included: preoperative change of consent from the parents, heavy bleeding (e.g. Placenta praevia/increta) or other unexpected complications during Phase 1 and mechanical difficulty with the lift out of the babies head or breech. All fetuses with prenatal diagnosed anomalies which required an immediate treatment were excluded (e.g. relevant congenital heart anomalies, closing defects of the abdominal wall, diaphragmatic hernia). In these cases the lift out of the newborn can be visible sometimes, but the neonate is then directly brought to the neonatologists for further therapy. Statistical tests were carried out using SPSS statistical package (Version 12, SPSS Inc, Chicago, IL). Descriptive statistics were performed. One way ANOVA was conducted to determine if the two groups CCB/CS (e.g. differences in the means of APGAR Score) differ significantly for the tested variables ($p < 0.05$). Given an effect size of 0.2 with an expected power of 80% a sample size of 200 was needed to show a significant difference between the two groups (ANOVA testing) at $p = 0.05$. We inflated the sample size allow to exclude non-responders of wrong filled questionnaires.

The procedure itself – the intervention arm

The modification was first introduced by Smith et al. The procedure performed at the Charité was a modification termed “Charité Cesarean Birth” and can be described as follows:

Phase 1: First, routine epidural anaesthesia is performed and sterile preparation is carried out. Then the surgery starts with the surgical drape screen up. The Misgav–Ladach technique is used to open the abdomen. The Operation Theatre is warmed and the lights are dimmed, also the staff is pleased to stay relatively quiet during the operation.

Phase 2: After the uterotomy, the surgeon lifts the head of the baby out of the uterus. Then the surgical drape is lowered. It is also possible to lower the screen before the lifting out of the head. This procedure will only be performed if no complications occurred during the operation. In the event of unexpected complications like heavy bleeding or problems with the lift out of the babies head, the surgical drape will not be lowered. During the antenatal counselling, patients were informed in detail about the steps of the procedure.

The principle is then to slowly “walk” the baby out and should be visible. It is also possible for the patient try to “actively push”. In contrast to the classical rapid removal of the newborn, this technique allows pressure from the uterus and other tissues to expel lung liquid. The trunk of the newborn compresses the uterotomy. Hence, a view into the opened abdomen for the mother and father or partner is not possible. Afterwards, the umbilical cord is clamped. Now the father or partner receives a pair of sterile scissors from the surgeon and then cuts the umbilical cord. The newborn is then examined by the obstetrician for fetal well being. If this is adequate, the newborn will be directly taken onto the naked skin of the mother’s breast. The baby is covered by a warm

Table 1. Reasons for planned primary CS.

Plazenta praevia; plazenta percreta	5%
Preeclampsia	5%
Suspected fetal macrosomia	12%
Multiple gestation	5%
Previous CS	51%
3rd/4th Degreee perineal laceration in previous births	2%
Other maternal or obstetric indication	4%
Breech presentation/malpresentation	16%

towel and is constantly observed by the midwife. The child will be monitored according the Apgar score. Early STS contact is established. The baby is then allowed to stay on the breast for the remainder of the operation. This is in contrast to the traditional CS where the baby is immediately taken away from the mother to a neonatologist or a midwife for an initial assessment. The early STS contact was tried to achieve in every patients and were according to the recommendations for implementation of immediate STS contact in the operating theatre by Stevens et al. [12].

Phase 3: Immediately after putting the baby on the mother's naked breast the surgical screen will be lifted up again before removing the placenta. The uterotomy and the abdomen are closed in the standard technique according to the Misgav-Ladach technique. The newborn should stay at least for one more hour with the mother.

Results

Study population

Between January 2014 and July 2014, we enrolled and randomized a total of 205 patients. Sociodemographical characteristics of the study sample are summarized in Table 2. Direct comparison of the two randomized groups showed that patients from the CCB group had a significant higher level of education with no other differences between the two groups. More than 50% had a previous CS, and this was the most

frequent reason for the CS. Also there was a small loss of follow up for the attending fathers due to unfulfilled questionnaires (see also randomization flow chart), but this was not statistically significant.

Primary outcome

Patient's birth experiences with a cesarean section were good to very good. According to the results, patients having a CCB had a significant better and more positive birth experience. The expectations towards the delivery were more often satisfied when a CCB was performed. When compared to the traditional CS, both mother and father or partner were much more satisfied with the abdominal delivery. Having the possibility to visualize the delivery of the baby and to maintain eye contact immediately after birth was reported to be very much important for the parents. When the surgical drape was lowered, patients rated this moment with the highest satisfaction scores in 92% of cases. Additionally, giving the partner the option to cut the umbilical cord offers an active integration in the delivery process. This step was rated as important to very important by the vast majority of the parents, and especially for the father or partner. The duration of the whole operation was recognized to be significantly shorter compared with patients from the traditional CS group. Patients in the CCB group perceived better care from all staff involved (including midwives, anesthesiologists, obstetricians and nurses).

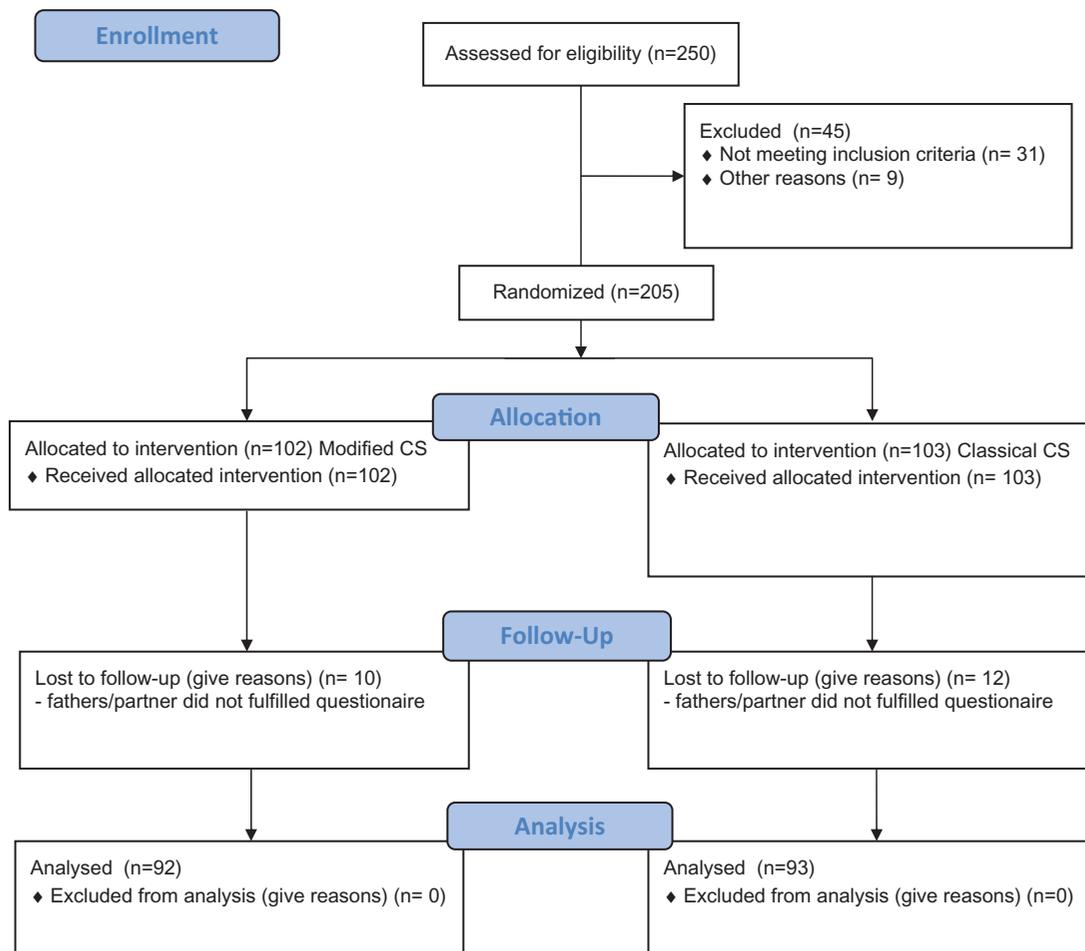


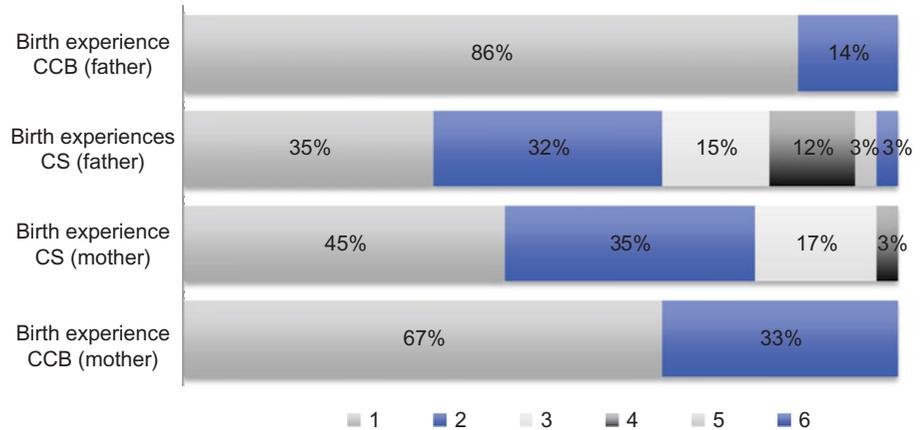
Figure 1. Flowchart of randomization process.

Table 2. Sociodemographical characteristics.

	CCB Mean (Min–Max)	CS Mean (Min–Max)	Chi-Test
Age	33 (21–41)	31 (17–42)	$p = 0.06$
Confession	14%/25%/16%/45%	10%/15%/28%/47%	$p = 0.13$
Degree of education	69%	40%	$p = 0.02$
Previous pregnancies	2 (1–7)	2 (1–8)	$p = 0.32$
Previous births	2 (1–3)	2 (1–5)	$p = 0.67$
Gestational week	39 (37–41)	39 (37–42)	
Previous vaginal birth	17%	19%	$p = 0.73$
Previous CS	50%	54%	$p = 0.64$
Multiple gestaton	5	5	

CCB = Charité Cesarean Birth, CS = Cesarean Section; women and men together.

Figure 2. Descriptive statistics of the satisfaction with the birth experience as conceived by mother and father. Modified Likert-Scales were used: 1 means highest degree of satisfaction and 6 the lowest.



The early skin-to skin contact and the opportunity to breast feed the baby was also reported to be very important. Overall, the rates of breast-feeding were very high but significantly higher in the CCB group (69% compared to 81%). Also fewer problems occurred during breast feeding in the CCB group ($p = 0.02$). For detailed information, see Figures 2 and 3.

Results show that patients who had a previous CS and now had the CCB would choose this option again instead of the traditional CS. Overall, more than 95% of the interviewed patients would again agree to the CCB if in a future pregnancy a Cesarean was indicated. When having a CCB, women reported that they felt significantly less disappointed about the need for the cesarean section. The feeling of “having missed” something special compared to a vaginal delivery was more common in the group of patients with a traditional CS. Parents also mentioned that the direct visualization of the birth, eye to eye contact and constant mother–infant bonding lead to a greater sense of security.

Secondary outcome

There was no significant difference in the time of the operation between the two groups (35 min) as well as for the blood loss (median 520 ml for both groups). Also intraoperative vital parameters of the patients did not differ significantly (SpO₂, blood pressure, need for circulation stabilizing medication). Patients of both groups were mobilized 24 h after surgery and discharged on an average of four days.

Overall, early STS contact was possible in 72% of cases. A consultation with a neonatologist was necessary in four

patients with 2 cases in each group. The APGAR scores at 1, 5 and 10 min were not significantly different in the two groups. The cardiorespiratory adaption was generally good with average APGAR Scores of 9/10/10 and normal ph values (7.28 in the group of CS and 7.27 in the group of CCB). According to these results, the procedure appears safe for both mother and baby. Detailed information is also summarized in Table 3.

Discussion

Main findings

One possible modification of the CS was published 2008 by Smith et al. and named “natural cesarean”. In terms of actively integrating the parents in the birth and to achieve a better birth experience the technique was further modified and introduced as the CCB. The authors state that the CS is a surgical procedure and should stay separately from a “natural” vaginal birth. Therefore we think that the term “natural cesarean” is misleading and confusing and named the procedure CCB. Main aspects are the direct visualization, cutting the umbilical cord and early STS contact. The operation theatre is warmed and the lights are dimmed. The results of the present trial clearly demonstrate that the CCB improves the birth experience and leads to a higher satisfaction with the birth compared to a traditional CS. It seems to be a safe procedure for mother and newborn with no differences in perinatal outcome. The early STS contact is therefore important for the mother and was reported to feel “good to very good” in the majority of the cases. Traditionally, is the

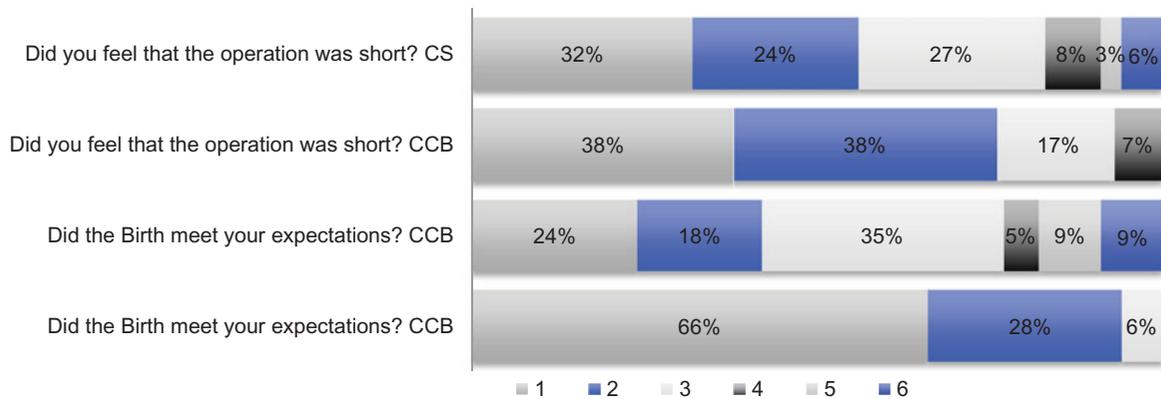


Figure 3. Attitudes towards the duration of the birth and parents' expectations. Again 1 means the highest agreement/degree of satisfaction.

Table 3. Results of the ANOVA regarding the birth experience and the differences between the two groups CS versus CCB.

	Mean	95% CI (SD)	<i>p</i>
Birth experience (mother)			
CCB	1.9	1.7–2.1 (0.97)	0.001
CS	2.6	2.1–2.4 (1.4)	
Birth experience (father)			
CCB	1.4	1.2–1.5 (0.73)	0.001
CS	1.8	1.5–2.0 (1.0)	
Did the birth meet your expectations?			
CCB	1.9	1.7–2.2 (1.1)	0.05
CS	2.7	2.4–3.0 (1.3)	
Duration of birth – Was it short?			
CCB	1.9	1.7–2.0 (0.97)	0.001
CS	2.6	2.3–2.9 (1.7)	
How did you perceive the care during the whole delivery process?			
CCB	1.3	1.2–1.5 (0.8)	0.03
CS	1.6	1.3–1.6 (1.1)	
Birth Satisfaction compared to previous CS	1.7	1.4–2.1 (1.3)	0.02
Did you have problems when breast feeding the baby?			
CCB	2.3	2.1–2.5 (0.96)	0.04
CS	1.5	1.4–2.0 (1.2)	

Only the significant results of the analyses are mentioned here. Likert Scales were used (min 1; max 6).

separation of mother and baby immediately after the delivery too frequent. Also, less problems with breast-feeding has been reported and a higher percentage overall of successful breast-feeding. Overall, patients felt better treated by the whole staff involved and perceived the abdominal delivery process as shorter and more satisfying.

There was no increase in the rate of the so-called CS on demand or maternal request during the duration of the study at the Charité University Hospital. The vast majority of the interviewed patients would choose the CCB in a future pregnancy in the need of another CS.

Strengths and limitations

This is the first prospectively, randomized controlled evaluation of CCB's effects. However, patients with a need for emergency CS should also be included in further studies. There were only slight significant differences between the two groups, e.g. sociodemographical parameters. It seems to be especially important to notice that there were no significant differences regarding the reasons for the CS. There was a high rate of early STS and no major or minor complications within the process. Nonetheless, it has to be mentioned that

the present study has some characteristics of a pilot study because the method was evaluated first. Main focus was to assess birth experience changes and get some first insights of the practicability of the CCB. To better evaluate, especially breast-feeding behaviors further studies with qualitative and more breast-feeding focused questionnaires is necessary. Also the Likert-Scales were not standardized totally, which is due to a relative heterogeneity of the questions and should be changed in further studies based on the present results.

Interpretation

There is a constant rise in cesarean section rates worldwide. At the same time, parent's expectations towards the birth of their baby have increased and have become significantly important. They want to and should be part of the delivery process. A father's or partner's attendance during the birth has become a routine practice by vaginal delivery. There is evidence that this attendance can reduce mother's fear and tension and therefore reduces cardiovascular changes in labor (e.g. hypotension) [6,7]. From the authors point of view, the "traditional" abdominal delivery procedures should be reconsidered. The cesarean section should be just as much

as the vaginal “natural” delivery a personal experience with active involvement of the parents. Also in high risk pregnancies with expected high morbidity for both mother and infant and the urgent need for a CS, an active integration or birth experience was not possible with the traditional CS. However, in some cases with severe abnormal placental invasion with the need of hysterectomy, the modification was successfully performed.

There is emerging evidence that STS contact seems to influence nervous system state organization and motor system modulation of the newborn infant shortly after delivery [13,14]. The time immediately after the birth is also a sensitive period for programming, releasing, and unlocking infant and maternal behaviours. Both the process of bonding and breastfeeding will have a determining influence on the state of the infant’s health and his or her emotional development [13–16]. The best way to promote a good start to life is to have a companion present during the cesarean and then to initiate (STS) contact immediately after the cesarean. This was not possible or not a routine procedure in many hospitals within a traditional CS. Nonetheless, it has to be mentioned that cases of sudden death during the first few hours after birth have been published [17]. Although the cause of these deaths is unknown, they have been related to the mother’s tiredness and lack of supervision, which could be due to obstruction of the respiratory tract, especially when breastfeeding. Therefore, to prevent infant suffocation, during the first few hours after birth it is essential that the infant be under both professional and parental supervision. At the Charité, mother and newborn are regularly supervised for at least 2 h postoperative in a regular interval.

There is no doubt, that the rate of CS and especially the constant increase should be critically viewed and that a spontaneous vaginal delivery should always be supported. Also, as in our study, a previous CS is the most common indication, it seems to be crucially important to prevent the first CS. There is also evidence that breast-feeding problems were most common in women having an elective caesarean section [18].

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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