

## In reply



We thank Dr De Bernardo and colleagues for their thoughtful letter. We agree that the sonographic technique used in our study has several important limitations. Nevertheless, it is currently the most widely used and validated method for evaluating the optic nerve in critically ill patients.<sup>1</sup> As a result, clinicians involved in management of severe pre-eclampsia are familiar with B-scan optic ultrasound. This technique is also considered a little bit easier to learn and perform compared to the A-scan, especially for doctors who are not specifically trained in ophthalmologic ultrasound. Moreover, applying the probe on open eyelids can be impractical and poorly tolerated by postpartum women. Of note, none of the drawbacks discussed by Dr De Bernardo and colleagues affects the clinical implications of our results. Systematic errors may have occurred in both patient groups, those with pre-eclampsia and healthy controls alike. Therefore, significantly higher optic nerve sheath diameters in those women with preeclampsia found in our study, as well as in the study by Dubost et al.,<sup>2</sup> still emphasizes the importance of intensive surveillance and individualized fluid management of preeclamptic patients.

We are heartened by the interest in ocular ultrasonography in patients with pre-eclampsia. We hope that our study will lead to larger, more robust, longitudinal studies that also assess differences between various measurement techniques and in predictive values for perinatal neurological complications associated with this disease.

M. Lucovnik, G. Brzan Simenc,  
K. Prokselj, M. Cvijic, J. Ambrozic

*Department of Perinatology  
Division of Obstetrics and Gynecology  
University Medical Center Ljubljana, Slovenia  
Faculty of Medicine, University of Ljubljana, Slovenia  
Department of Cardiology University Medical Center  
Ljubljana, Slovenia*

Correspondence to: M. Lucovnik, University Medical  
Centre Ljubljana, 4 Slajmerjeva, 1000 Ljubljana  
Slovenia

*E-mail address:* [miha.lucovnik@kclj.si](mailto:miha.lucovnik@kclj.si)

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### Which anesthetic technique should be used for cesarean section in the case of Horner's syndrome associated with epidural analgesia in labor?



Recently, Chambers and Bhatia published a very good review of Horner's syndrome (HS) following obstetric neuraxial blockade.<sup>1</sup> As explained by the authors, the main mechanism of HS in pregnant patients receiving epidural analgesia is the cephalic spread of local anesthetic leading to block of the sympathetic chain from C8 to T1. These thoracic levels correspond to a potentially dangerous situation in the case of complete sensory and motor anesthesia. Consequently, many anesthesiologists who are not fully familiar with this uncommon syndrome may be concerned about maintaining epidural block and might decide to stop or to temporarily decrease the amount of local anesthetic given until the complete resolution of the HS. The authors of the review article gave different advice, reporting that in the majority of cases in which epidural analgesia was maintained the HS resolved spontaneously without complications.

In the case of an emergency cesarean section in a woman with HS related to epidural analgesia, which is a more stressful situation, the management of the epidural anesthetic was not discussed. When parturients need an emergency cesarean section while receiving epidural analgesia during labor, an epidural top-up is usually performed. Of the 63 cases of HS reported by the authors,<sup>1</sup> 13 subsequently underwent a cesarean section. For 10 of these 13 women, the HS was diagnosed during or after the cesarean section. Only three women had the diagnosis made before the decision to deliver by cesarean section. Among those case reports, in one woman epidural analgesia was augmented with 20 mL of local anesthetic (the initial sensory block level was T7);<sup>2</sup> in another epidural analgesia was converted to general anesthesia;<sup>3</sup> and in the last case epidural analgesia was converted to spinal anesthesia.<sup>4</sup>

It would be interesting to know the practices and advice of the authors with regard to epidural top-ups when an emergency cesarean section has to be performed in a parturient who has HS related to epidural labor analgesia.

L. Bouvet

*Service d'anesthésie réanimation, Hôpital femme mère enfant, Bron, France*

D. Chassard

*Service d'anesthésie réanimation, Hôpital femme mère enfant, Bron, France*

*Université de Lyon, Lyon, France*

*E-mail address: dominique.chassard@chu-lyon.fr*

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## In reply



We would like to thank Bouvet and Chassard for their interest in our review.<sup>1,2</sup> They raise an important point which is relevant to obstetric anaesthetists in their day-to-day practice. As Bouvet and Chassard point out, high neuraxial blockade has long been considered to be dangerous, especially at the high thoracic or low cervical vertebral levels due to the associated adverse cardiovascular and respiratory consequences. As the onset of Horner's syndrome (HS) results from interruption of oculo-sympathetic fibres which are said to exist between T1 and C8, one would expect concurrent hypotension and respiratory difficulty.

In our opinion one of the most interesting findings of the review is the lack of adverse features and the low level of cutaneous sensory blockade associated with the onset of HS during obstetric neuraxial blockade. The mean level of sensory blockade reported was only T4 and the level was as low as T12. In most cases, HS occurs despite the cutaneous level of blockade being significantly below the lower limit at which the oculo-sympathetic fibres emerge from the sympathetic chain. It is not completely clear to us why this large discrepancy between the level of cutaneous blockade and HS exists – we speculate that possibly the oculo-sympathetic fibres are more susceptible to the effects of local anaesthetic during pregnancy. Only 13% of cases of HS experienced

systemic hypotension and only one a consequent fetal bradycardia, with all cases managed successfully using intravenous fluid and vasopressors. Finally, there were no reports of airway or ventilatory compromise associated with HS.

In answer to the practical question regarding the feasibility of an epidural top-up in the management of a parturient undergoing a category 1 caesarean section, our view remains that the presence of HS alone should not influence anaesthetic management and that these women should not be denied neuraxial anaesthesia. Many anaesthetists may not note the presence of HS after an epidural top-up in theatre. The presence of HS alone does not appear to be strongly associated with systemic hypotension or with adverse maternal or fetal outcomes. On the other hand, in our opinion, if HS co-exists with systemic hypotension, upper limb weakness or cranial nerve palsy, one should carefully consider the risks of proceeding to an epidural top-up compared to the risks of alternative anaesthetic management.

D.J. Chambers

*Salford Royal NHS Foundation Trust, Salford, United Kingdom*

K. Bhatia

*Manchester University Hospital NHS Foundation Trust  
St Mary's Hospital, Manchester, United Kingdom*

*E-mail address: kailash.bhatia@mft.nhs.uk*

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## In vitro intravenous fluid co-load rates with and without an intravenous fluid warming device



Delivery of an intravenous fluid co-load decreases hypotension after spinal anesthesia.<sup>1</sup> Fluid warming is recommended to reduce the incidence of hypothermia after caesarean delivery.<sup>2,3</sup> However, the increased tubing length and resistance of an in-line fluid warming device may reduce the speed of fluid administration and