

Reply to “3D to boldly go where no 2D has gone before? Pitfalls in the 3D reconstruction of the fetal palate.”

We thank Drs Tutschek and Blaas for their response and critique of our paper on Crystal Vue Imaging of the fetal face and palate (1,2). Though the discussion has moved from Crystal Vue imaging of the palate (1) to the 3D reverse face (3D RF) view technique (3,4), we are happy to respond to these new points.

In their new reply Tutschek and Blaas state that “magically, the “3D RF view overcomes this problem (of shadowing)” (5). In the methods describing volume acquisition using the 3D RF technique (4) it is explicitly stated that “care was taken to avoid intervening limbs or umbilical cord obstructing the view” during volume acquisition. Hence the 3D RF technique is based on surface rendering of (ideally) optimally acquired volumes and allows the unobstructed visualization of the palate when navigated from the back to the front but not vice versa. There is nothing magical about it. Further, in undertaking the 3D RF technique it is stated that “further movement of the viewbar through the face to identify the palate usually resulted in a severely shadowed image which was diagnostically unhelpful and may be misleading”. It is important to note that the concept of shadowing in this context is not related to the mode of acquisition of the volume but instead to post processing and rendering and should not be confused with the description of suboptimally acquired volumes of Drs Tutschek and Blaas in Figures 1A and 1B from their former reply (6).

As far as insonation is concerned, Drs Tutschek and Blaas state that this should be angled-in other words we assume that they mean not exactly parallel to the plane of the structure undergoing investigation (5). We agree with this concept and all our insonations were slightly angled, either caudally or cranially. Indeed “limited” shadowing does not prevent the satisfactory evaluation of the secondary palate, which is a thick structure with an upper and a lower border. Its integrity (and defects) can be clearly evaluated in this way. Relating to the figure shown in our former reply (2), which is displayed as Figure 1, we have demonstrated that palatal structures were included in our index volume, albeit with some shadowing. (Caudally) angled insonation was first described by Pilu and Segata and represents a clever approach to optimize the visualization of the fetal palate (7), but beyond a technical description there is no prospective validation of this technique. Therefore, while proponents might support different techniques for the evaluation of the fetal palate, it is not possible to claim that a body of evidence supports one over the other (1,4,7-11). The 3D reverse face technique has been tested in the largest series of fetuses with facial clefts and the antenatal diagnosis relates closely to postnatal findings (12). Hence, we contend that the recently published and generally comprehensive 3D facial imaging guidelines are incomplete in this respect (13).

Tutschek and Blaas suggest the palate is flatter at mid gestation than in the third trimester but we are aware of no study or other data evaluating intrauterine palatal development using ultrasound. Nevertheless, if this theory were correct, this might explain why the images we obtained from third trimester fetuses were less prone to shadowing compared to those shown by Drs Tutschek and Blaas. In their image 1A, the non-visualization of the secondary palate on the axial plane is ascribed to shadowing, which is absent in figure 1B. This assumption cannot be confirmed if the multiplanar imaging is not displayed, as it is not possible to evaluate the actual level at which the fetal face is imaged. For example, image 1A might also display the axial view of the lower alveolar ridge, a level at which it is not possible to image the secondary palate immediately behind it, hence its non-visualization could not be ascribed to shadowing; in figure 1B, the axial plane might be slightly higher, hence the palate can be seen (6).

We thank Drs Tutschek and Blaas for pointing out that in figure 2B from our original manuscript (1) the label "1" should have been placed on the echogenic secondary palate and not on the upper anechoic structure. They are correct in noting this however we believe that this mis-labelling will be obvious to the expert readership of this journal.

In conclusion, we do not claim a monopoly of wisdom in this complex area of imaging where as many different techniques and opinions exist as there are experts. Antenatal palatal imaging still remains a subject of controversy and individual expert opinion which cannot be satisfactorily resolved via correspondence. We would hope that a consensus opinion among experts in the field might be reached which would be of great value for the readers of the journal and beyond.

Andrea Dall'Asta^{1,2}, Gowrishankar Paramasivam¹, Christoph C Lees^{*1,3,4}

¹Centre for Fetal Care, Queen Charlotte's and Chelsea Hospital, Imperial College Healthcare NHS Trust, London, UK

²Obstetrics and Gynecology Unit, University of Parma, Parma, Italy

³Department of Surgery and Cancer, Imperial College London, London, UK

⁴Department of Development and Regeneration, KU Leuven, Leuven, Belgium

*Correspondence e-mail: christoph.lees@nhs.net

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Figure 1 – Multiplanar view of the index volume: coronal plane (a) and sagittal plane (b), showing secondary palate with midpalate shadowing (arrow); (c) axial plane, showing secondary palate (arrows) along with interpalatal fissure (*).

