Cover Letter

This is original paper and no conflict with other paper , no problem of Ethical Adherence. This is a paper of ideas and Innovations. We have developed A new technique of suturectomy and sutural distraction osteogenesis (SDO) by the use of internal distractor is presented. The technique of suture osteotomy and distraction osteogenesis is suitable for infants. The technique of sutural distraction osteogenesis is suitable for young infant, the ages were below 6 month. The distraction system used of internal distraction and a suturectomy is needed, we did coronal suture strip craniectomy with surgybone(Silfradent S.r.l.), the width of strip was 2cm. During surgery, we assessed the synostosis of the coronal suture on the left side and placed two internal distracters beside left coronal suture. On the second day after the surgery, the distraction of 1.2 mm per day started and continued for 15 days, and 18mm forward distraction was obtained. The children with plagiocephaly were treated by suturectomy and sutural distraction.After remove distraction,we had filled a medpor in the skull defect site and repaired the skull defect caused by distraction. After being distracted, the patients established harmonious facial profiles and normal foreheads. Radiographic examination showed balanced advancement of the skeleton. It is suggested that the treatment of plagiocephaly in infant by the technique of suture osteotomy and sutural distraction osteogenesis is to be preferred because of its simplicity and relative minimal invasive. Thus, we suggest that plagiocephaly should be treated at a young infant by this technique.

# suturectomy and Sutural Distraction Osteogenesis (SDO)of internal distractor treated unilateral coronal synostosis: A Primary Clinical Report

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**Abstract**：A new technique of suturectomy and sutural distraction osteogenesis (SDO) by the use of internal distractor is presented. The technique of suture osteotomy and distraction osteogenesis is suitable for infants. The technique of sutural distraction osteogenesis is suitable for young infant, the ages were below 6 month. The distraction system used of internal distraction and a suturectomy is needed, we did coronal suture strip craniectomy with surgybone(Silfradent S.r.l.), the width of strip was 2cm. During surgery, we assessed the synostosis of the coronal suture on the left side and placed two internal distracters beside left coronal suture. On the second day after the surgery, the distraction of 1.2 mm per day started and continued for 15 days, and 18mm forward distraction was obtained. The children with plagiocephaly were treated by suturectomy and sutural distraction.After remove distraction,we had filled a medpor in the skull defect site and repaired the skull defect caused by distraction. After being distracted, the patients established harmonious facial profiles and normal foreheads. Radiographic examination showed balanced advancement of the skeleton. It is suggested that the treatment of plagiocephaly in infant by the technique of suture osteotomy and sutural distraction osteogenesis is to be preferred because of its simplicity and relative minimal invasive. Thus, the authors suggest that plagiocephaly should be treated at a young infant by this technique.

**Keywords** Craniosynostosis . sutural distraction osteogenesis . unilateral coronal synostosis. anterior plagiocephaly

anterior unilateral plagiocephaly is a common deforfmity in craniofacial surgery. In severe cases, complications such as bleeding, infection, and high danger may occur after traditional advancement. In addition, scar restriction and high rates of relapse may be seen in some patient.Sutural distraction osteogenesis provides an easier, safer, and more efficacious method for correction of craniofacial deform. In this paper, we present a cases of unilateral coronal synostosis treated by suturectomy and Sutural distraction osteogenesis.

**Case**

A 6-month-old male infant was referred to our hospital for a left frontal flattening. The obstetrical history was unremarkable and the delivery. His parents had noted the asymmetry early after the birth of the infant. On clinical examination, there was a left frontal flattening, a slight deviation of the tip of the nose toward the flattening, but no harlequin's eye. A depression could be seen at the fronto-temporal junction. The cranial perimeter was normal for the age (Fig. 1a,1b). On CT scan, there were patent coronal sutures, the size of the orbit was slightly smaller on the left, and there was a thickening of the pterion, with a retrusion of the greater sphenoidal wing. On the 3D reconstruction, there was a clear synostosis of the left coronal suture (Fig. 2a,2b). The parents were informed of the cosmetic aspect of the surgery and, concerned with the progressive deformation, wished for it to be done. suture osteotomy and sutural distraction was planned.Surgery was performed through half coronal incision to expose half frontal bone and superior half of the orbit by subperiosteal dissection. Expose left fused

coronal suture and the temporal fossa behind the zygomtic process of the left frontal bone. Half coronal suture osteotomy was performed ,without extradural dissection.we did coronal suture strip craniectomy with surgbone(Silfradent S.r.l.), the width of strip was 2cm.During surgery, we could assessed the synostosis of the coronal suture on the left side,and placed two internal distracters beside left coronal suture(fig.3). On the second day after the surgery, the distraction of 1.2 mm per day started and continued for 15 days, and 18mm forward distraction was obtained. The postoperative clinical course was uneventful. Three months after the surgery, Take a CT (fig.4), the internal device was taken off. After remove distraction,we had filled a medpor in the skull defect site and repaired the skull defect caused by distraction. Postoperative follow-up showed a nice cosmetic result, albeit with left smaller orbit, which progressively widened with time (Fig. 5a,5b). After operated 36 months ,we do CT examination,have Normal skull growth (Fig. 6a,6b) ,the shape of head have passed with satisfactory results (Fig. 7a,7b). No complications of infection, bleeding, or fistula were observed in the patient.

**DISCUSSION**

since the first clinical report of distraction osteogenesis in human mandible of hemifacial microsomia by McCarthy et al[1] in 1992, the distraction technique has been extended to the entire craniomaxillofacial area. Distraction osteogenesis has been applied to the craniosynostosis, and several positive reports have been appeared in the literature. [2–6] Kobayashi et al[7] first challenged the use of a unidirectional internal device for a mild case of unilateral coronal synostotic plagiocephaly with an excellent result in 1999. In 1995, Staffenberg et al[8]reported experimental protraction of midfacial skeleton without osteotomy (ie, the technique of sutural distraction osteogenesis [SDO]). Experimental protraction of craniofacail skeleton without osteotomy also reported by Sasaki[9]in 2002. In 2005, Liu et al [10] reported seven adult and pediatric patients with severe midfacial hypoplasia have been treated through SDO without osteotomy by using bone-borne traction hooks secured in medium location of the midface skeleton through the nostrils and a facebow.In 2011, Liang et al [11] reported experimental protraction of midfacial skeleton by using trans-sutural distraction osteogenesis.These were sutural distraction osteogenesis of midfacial skeleton.

Promoting growth of skull by forces of distraction were sutural distraction osteogenesis of skull. craniosynostosis were treated using endoscopic suturectomy and completed helmet therapy were example simply[12-14]. Therefore,we designed suturectomy and sutural distraction osteogenesis of internal distraction. The sutural distraction technique for craniosynostosis has several advantages. First of all, no subcranial dead space remains. Secondly, much less dural dissection is required. Thirdly, no free bone is created. Last but not least, there is less blood loss.The technique was minimal invasive .Disadvantages include secondary surgery for removal of the internal devices, the difficulty of meticulous reshaping during the distraction and recurrence of craniosynostosis. Considering the potential utility of the sutural distraction technique, simple craniosynostosis such as plagiocephaly is one of the suitable candidates for the sutural distraction because of surgical simplicity, ease, and minimal invasiveness. The technique of sutural distraction osteogenesis is suitable for young infant, the ages were below 6 month. it is easy to distract. Plagiocephaly due to coronal synostotic has the complex deformity of the supraorbital and forehead contour, hypercorrection are definitely required ,when distraction is applied. Mesa[15]also believed that think unicoronal plagiocephaly repair with a hypercorrection surgical technique can avoid long-term relapse.Moreover, although the orbital dystopia can be improved by the planned vector of the distraction, the recessed supraorbital area, particularly, is almost impossible to reconstruct by simple distraction alone. In addition, the recessed

deformity of the supraorbital area is relatively conspicuous, and aesthetic correction is often required. Even if distraction technique renders less invasive surgery, when it is applied, even minor deformity should be avoided. Otherwise, one-stage precise symmetrization with parallelogrammic adjustment and frontal reshaping outweighs the latest technique. From that point of view, we placed on left supraorbital frontal with suture strip. Completely correct unicoronal synostotic plagiocephaly. Treatment of unicoronal synostotic plagiocephaly of the child by the current technique satisfies many of these tenets. Thus, we advocate treating the unicoronal synostotic plagiocephaly at a young infant by the technique of sutural distraction osteogenesis,eliminating the need for wide range osteotomy.

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Fig1 peroperation view. A front B view from above

Fig2 3D-CT front and oblique reconstructions showing a clear synostosis of the left coronal suture:A front,B oblique.

Fig3 Intraoperative view of two internal distraction devices.

Fig4 3D-CT photography before the internal device was taken off.

Fig5 front and superior photography before the internal distraction device was taken off.a front, b view from above

Fig6 3D-CT photography 36 month after surgery:a front view, b view from above

Fig7 views 36 month after surgery: a front view, b view from above

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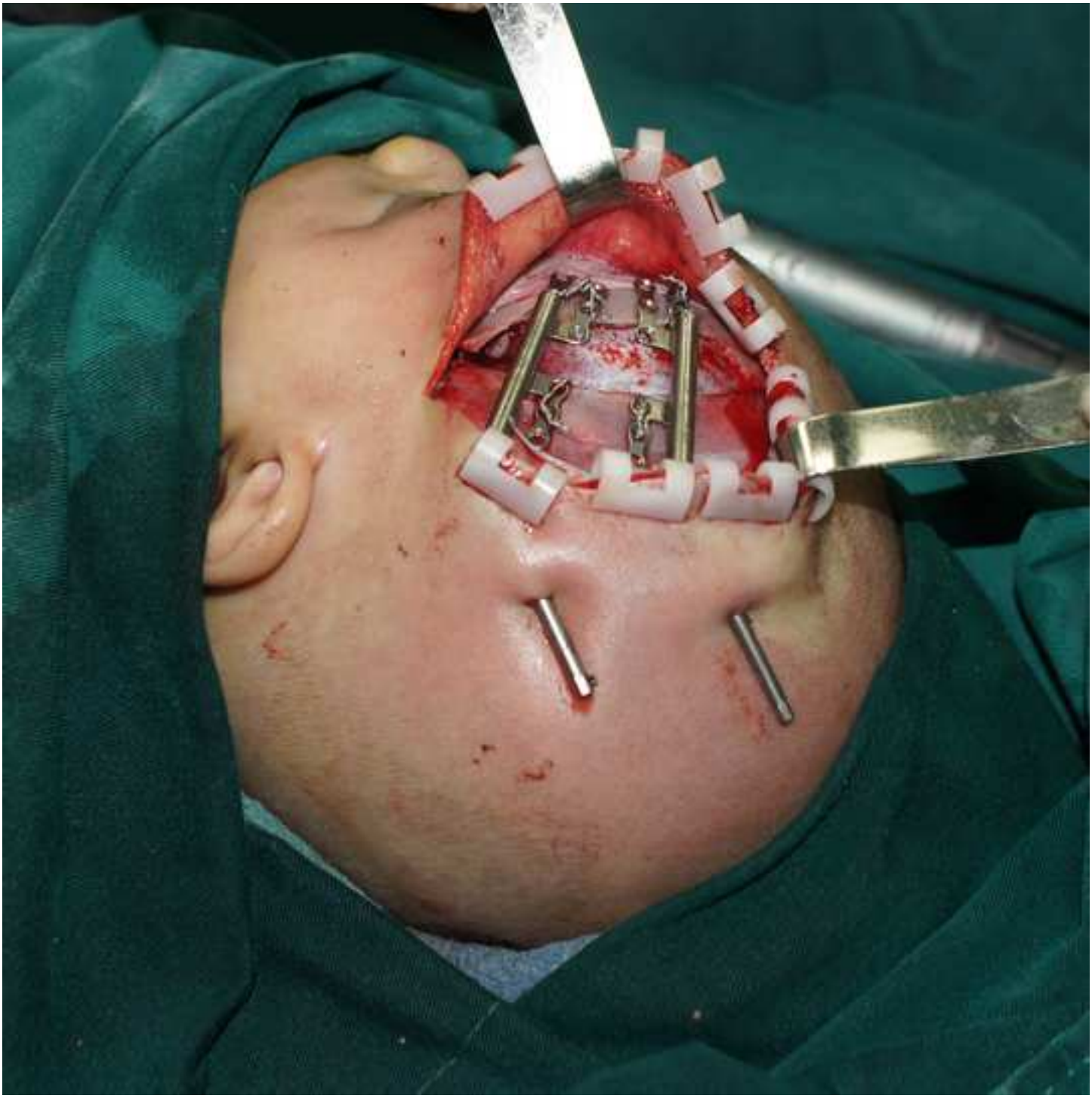

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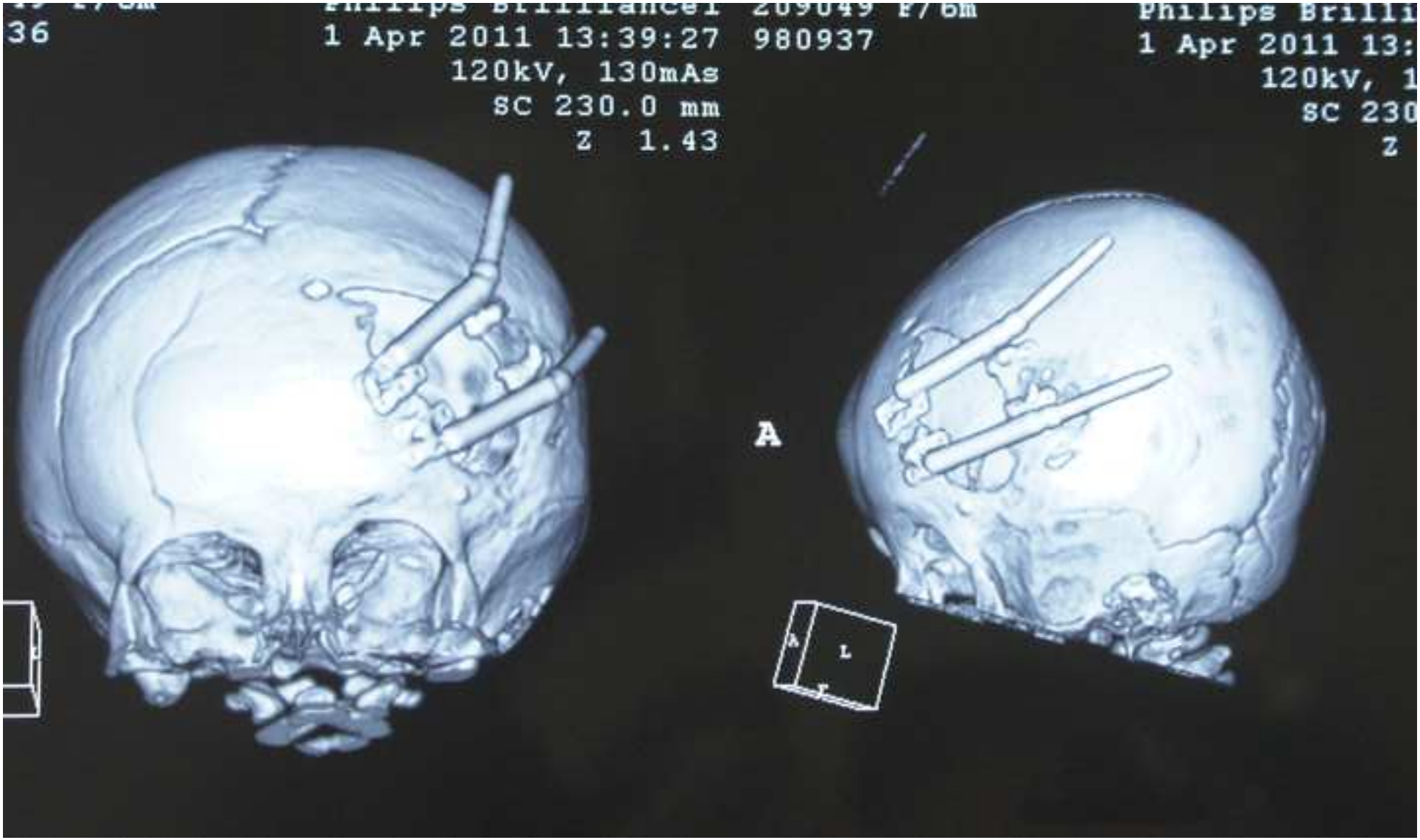

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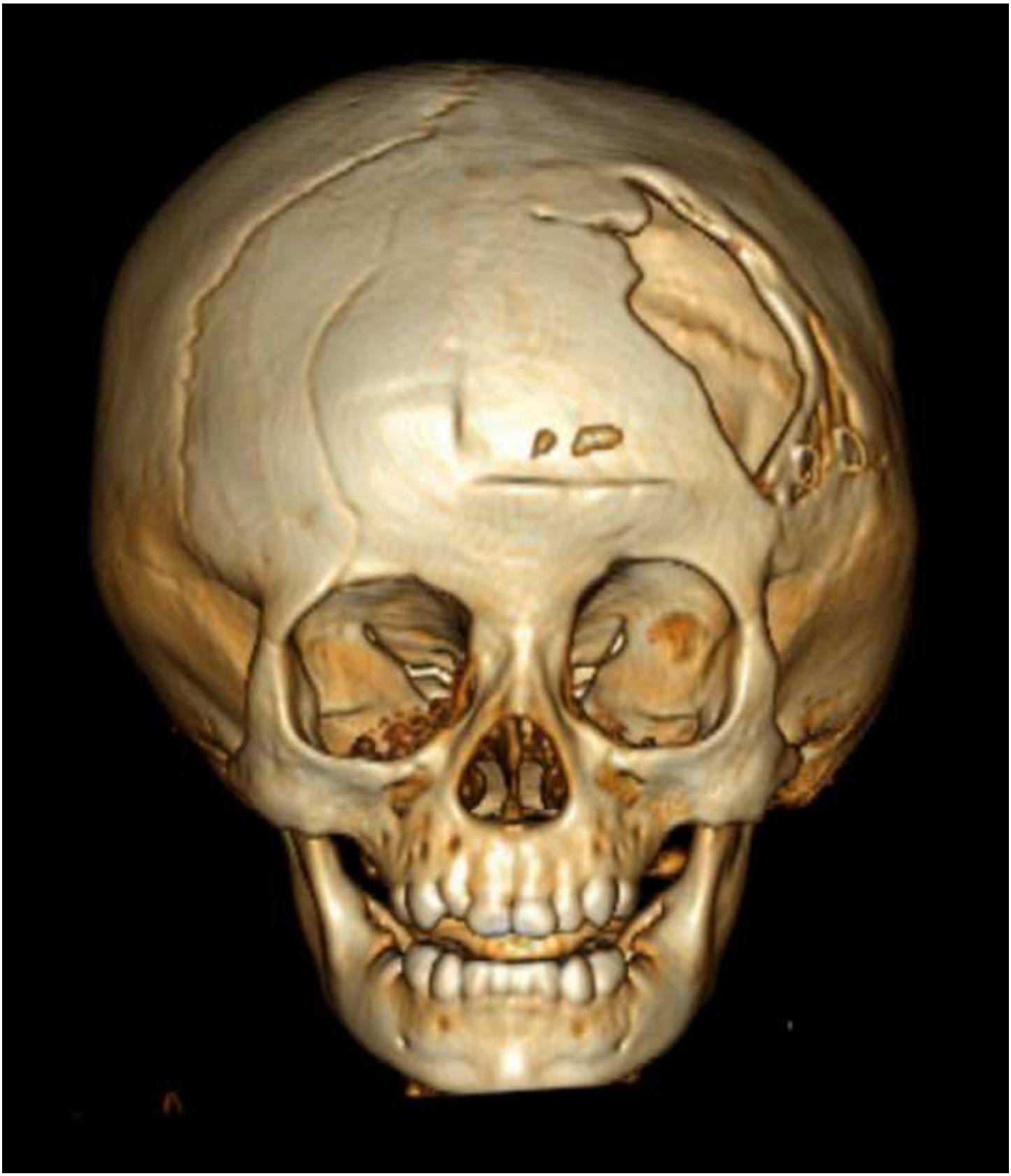

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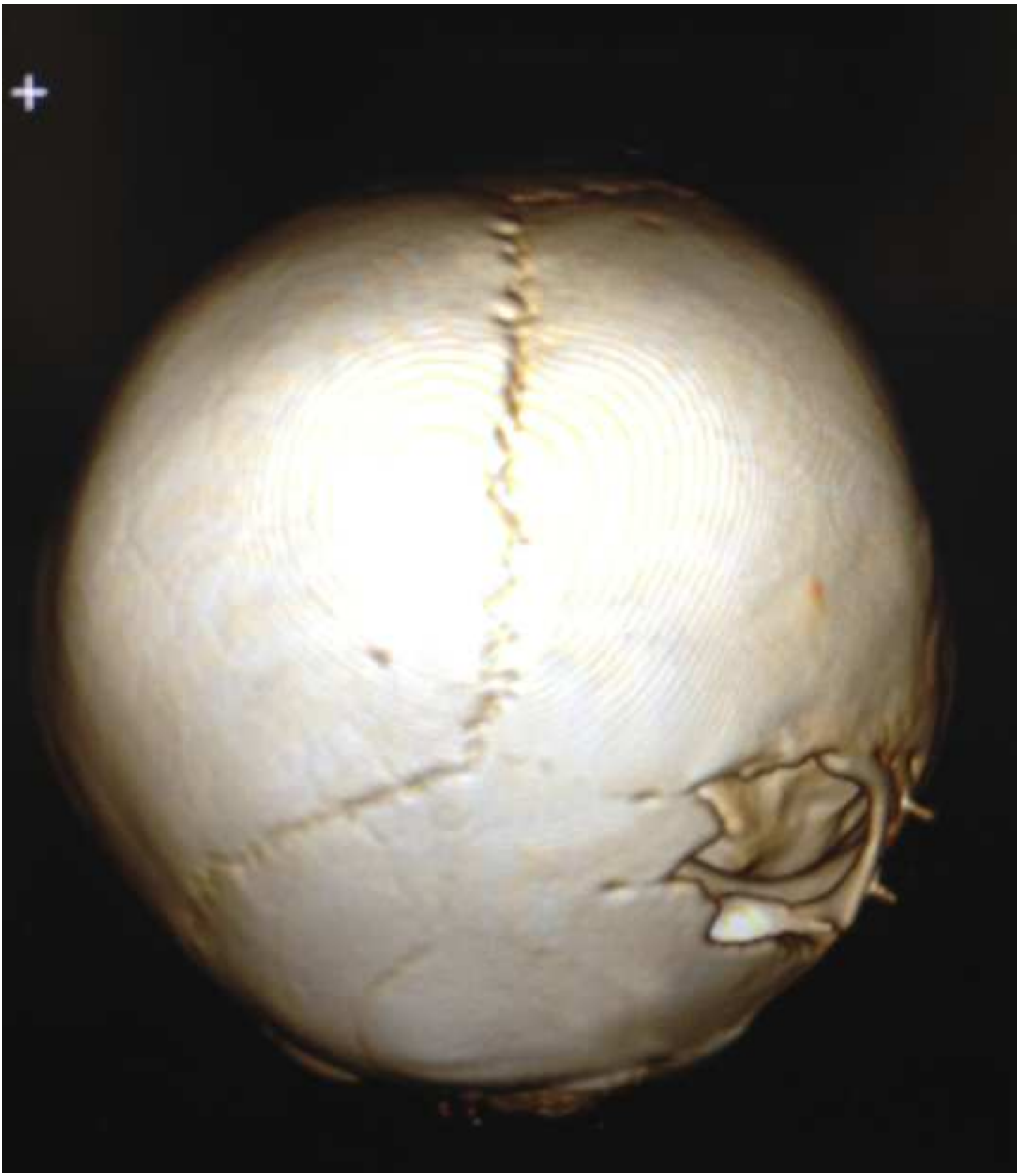

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