

# Medpor Bone Implant Mimicking Postoperative Epidural Hematoma

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## ABSTRACT

Presently described is case in which early postoperative cranial computed tomography (CT) image demonstrated hyperdense epidural mass adjacent to microporous high-density polyethylene implant (Medpor; Stryker, Kalamazoo, MI, USA) that strongly mimicked epidural hematoma. Another cranial CT image obtained 24 hours after operation indicated that epidural mass had resolved. This case is the first in the English-language literature of mock epidural hematoma related to cranial reconstruction with Medpor.

## INTRODUCTION

Cranioplasty is defined as surgical intervention to repair cranial defects, and bone implants are very useful in cranioplasty. Porous high-density polyethylene (PHDPE), formed by polymerization of ethylene at high pressure and temperature into straight-chain aliphatic hydrocarbons, has been used in reconstructive surgery since the early 1970s.<sup>[1]</sup> This implant material has high tensile strength. It is somewhat flexible at room temperature; however, it becomes malleable in hot water. After cooling, it maintains shape because overall macromolecular structure of the implant is not disrupted.<sup>[2,3]</sup> This material is quite effective in cranioplasty. Described presently is case in which early postoperative cranial computed tomography (CT) image demonstrated hyperdense epidural mass adjacent to Med-

por implant (Stryker, Kalamazoo, MI, USA) that strongly mimicked epidural hematoma (EDH). Another cranial CT image obtained 24 hours after operation revealed that epidural mass had resolved.

## CASE REPORT

A 6-year-old boy with cranial deformation was admitted to pediatric neurosurgery clinic. Reconstruction of the cranium was performed using high-density porous polyethylene sheet (Medpor®), 3 mm in thickness. First, implant was soaked in antibiotic solution (80 mg gentamicin diluted in 10 mL balanced salt solution for 15 minutes before use). It was cut with heavy-duty, general purpose scissors and contoured to cover the cranial defect. Material was easily shaped to harmonize with bony surface and was then fixed with sutures.

Early postoperative (8 hours after operation) routine cranial CT demonstrated hyperdense epidural mass that strongly mimicked EDH (Figure 1). Since neurological status of the child was normal, he was followed-up conservatively. Another CT image obtained 24 hours after operation indicated that the epidural mass had resolved (Figure 2). When localization of EDH adjacent to Medpor implant was considered, it was decided that image was, in fact, enlarged, blood-soaked Medpor sheet. Postoperative period was uneventful; the patient recovered well and was discharged from the hospital on postoperative 10<sup>th</sup> day. The parents have provided written consent for publication of this case.

## DISCUSSION

The risk of major complications after cranial operation is not low (3% to 19%). Urgent reoperation for major regional complications is usually very successful.<sup>[4]</sup> EDH, one of the most common regional complications after intracranial operations, manifests in brain displacement and some localizing neurological deficits.<sup>[5]</sup> Incidence of postoperative EDH has been reported to be 1.3% in craniotomies and 0.9% in intracranial operations.<sup>[6,7]</sup>

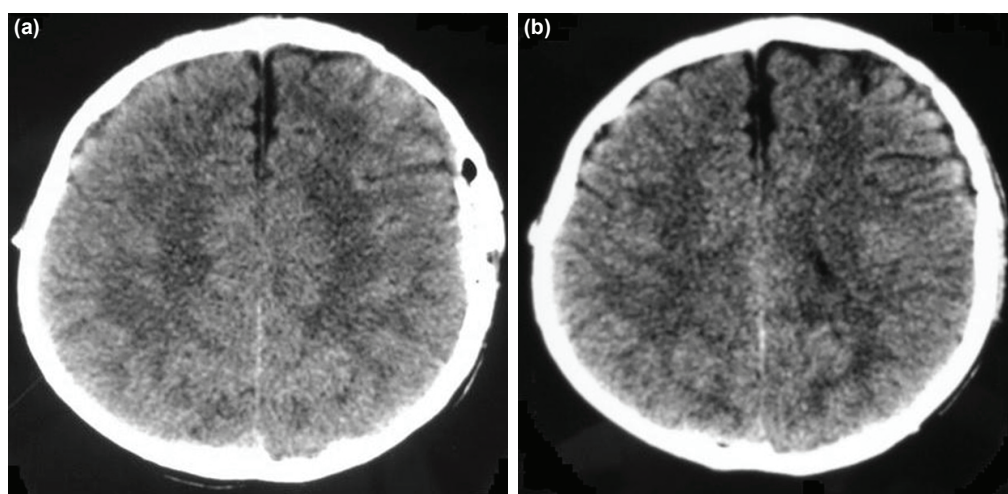
Accurate and rapid diagnosis is very important for successful management of postoperative complications.<sup>[8]</sup> Emergency CT is used when intracranial complication is suspected following operation.<sup>[7,9,10]</sup> Radiological findings of EDH have been well described. Mere presence of EDH does not necessarily necessitate reoperation; small accumulation of blood may be treated conservatively. However, delayed neurological decline is seen in the first hours because of slow expansion of venous epidural bleeding, and follow-up CT can be life-saving. Thus, neurological as-

essment first in recovery room and then in intensive care unit is extremely important.<sup>[4]</sup>

Bone implants are good means of surgical treatment for craniofacial deformities. Implant should be inert, non-carcinogenic, non-inflammatory, and non-allergenic. Resistance to mechanical strain, and easy shaping are also necessary qualities for bone implants. Good implant integrates into surrounding soft tissues, cartilage, and bone. Autogenous implants have been advocated; however, harvesting them increases operative time and is associated with potential for serious donor site morbidity. Adapting these relatively flat and inflexible grafts to complex contours of the cranium is difficult. Furthermore, graft resorption may also occur with autogenous implants.<sup>[11,12]</sup>

Alloplastic implants are very useful for cranioplasty. Smooth-surfaced, solid implants include those made of silicone, methylmethacrylate, vitallium, silicone rubber, and titanium. Porous materials include polytetrafluoroethylene, hydroxyapatite, and various mesh-type materials, such as polyamide mesh.<sup>[11,12]</sup>

PHDPE can be used to repair cranial defects successfully, and complication rate is not high. As result of its open, porous character, it is well vascularized early, which is followed by soft tissue in-growth and collagen deposition. No capsule formation occurs and it supports skin grafts.<sup>[11-13]</sup> Fibrovascularization of implant results in firm attachment to the surrounding tissue. Fibrovascularization is evidenced by CT and magnetic resonance imaging showing enhancement of PHDPE.<sup>[14]</sup> In clinical practice, postoperative EDH does not resorb in 24 hours. In our case, hyperdense epidural mass that strongly mimicked EDH was resorbed in 24-hour follow-up period. Rather than hematoma, this hyperdense epidural mass may have been early reaction or swelling of PHDPE. To our knowledge, this case is the first



**Figure 1.** (a) Axial computed tomography image obtained 8 hours after the operation demonstrates left-sided hyperdense extra-axial lentiform collection. (b) Axial computed tomography image obtained 24 hours after the operation reveals that the accumulation has subsided.

in the English-language literature of mock EDH related to cranial reconstruction performed with Medpor.

#### Authorship contributions

Concept: U.A.; Design: U.A.; Data collection &/or processing: M.G.; Analysis and/or interpretation: B.G.; Literature search; S.K.; Writing: U.A.; Critical review: B.G.

#### Conflict of interest

None declared.

## REFERENCES

- Berghaus A. Porous polyethylene in reconstructive head and neck surgery. *Arch Otolaryngol* 1985;111:154–60. [CrossRef]
- Lacey M, Antonyshyn O. Use of porous high-density polyethylene implants in temporal contour reconstruction. *J Craniofac Surg* 1993;4:74–8. [CrossRef]
- Gazıođlu N, Ulu MO, Ozlen F, Uzan M, Ciplak N. Acute traumatic orbital encephalocele related to orbital roof fracture: reconstruction by using porous polyethylene. *Ulus Travma Acil Cerrahi Derg* 2008;14:247–52.
- Taylor WA, Thomas NW, Wellings JA, Bell BA. Timing of postoperative intracranial hematoma development and implications for the best use of neurosurgical intensive care. *J Neurosurg* 1995;82:48–50.
- Winston KR. Efficacy of dural tenting sutures. *J Neurosurg* 1999;91:180–4. [CrossRef]
- Troupp H. Extradural hematoma during craniotomy. Report of five cases. *J Neurosurg* 1974;40:783–5. [CrossRef]
- Fukamachi A, Koizumi H, Nagaseki Y, Nukui H. Postoperative extradural hematomas: computed tomographic survey of 1105 intracranial operations. *Neurosurgery* 1986;19:589–93. [CrossRef]
- Dauch WA, Szilagyi KD. “Medical decision making” for repeated computed tomography in neurosurgical intensive care patients. *Neurosurg Rev* 1994;17:141–4. [CrossRef]
- Fukamachi A, Koizumi H, Nukui H. Postoperative intracerebral hemorrhages: a survey of computed tomographic findings after 1074 intracranial operations. *Surg Neurol* 1985;23:575–80. [CrossRef]
- Palmer JD, Sparrow OC, Iannotti F. Postoperative hematoma: a 5-year survey and identification of avoidable risk factors. *Neurosurgery* 1994;35:1061–4. [CrossRef]
- Maas CS, Merwin GE, Wilson J, Frey MD, Maves MD. Comparison of biomaterials for facial bone augmentation. *Arch Otolaryngol Head Neck Surg* 1990;116:551–6. [CrossRef]
- Wellisz T. Clinical experience with the Medpor porous polyethylene implant. *Aesthetic Plast Surg* 1993;17:339–44. [CrossRef]
- Wellisz T, Kanel G, Anooshian RV. Characteristics of the tissue response to MEDPOR porous polyethylene implants in the human facial skeleton. *J Long Term Eff Med Implants* 1993;3:223–35.
- De Potter P, Duprez T, Cosnard G. Postcontrast magnetic resonance imaging assessment of porous polyethylene orbital implant (Medpor). *Ophthalmology* 2000;107:1656–60. [CrossRef]

## Operasyon Sonrası Epidural Hematomu Taklit Eden Medpor Kemik İmplant

Erken ameliyat sonrası rutin kraniyal bilgisayarlı tomografi (BT) görüntülerinde belirgin şekilde epidural hematoma taklit eden ve 24 saat sonraki kraniyal BT görüntülerinde epidural kitle görünümünün kaybolduđunun gözleendiđi, gözenekli yüksek yoğunluklu polietilen kemik implantına (Medpor; Stryker, Kalamazoo, MI, USA) komşu hiperdens epidural bir kitleyi sunuyoruz. Bu olgu İngilizce literatürde Medpor ile yapılan kraniyal rekonstrüksiyonda epidural hematoma taklit eden ilk olgudur.

**Anahtar Sözcükler:** Epidural hematoma; kemik implant; Medpor; polietilen.