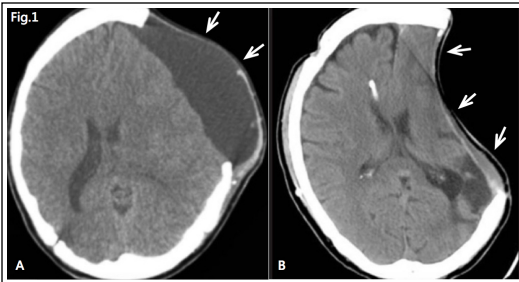


Introduction

Decompressive craniectomy (DC) has been used most often in traumatic brain injury and malignant cerebral infarction. Yet, DC has its risks and related complications(Fig.1). Besides, following cranioplasty was needed for the iatrogenic skull defect and may carry additional surgical risks[7].

Hinge craniotomy (HC) was introduced for cerebral decompression in 2007[1,3,8] and was later proved to be as good as DC in ICP control and equivalent early clinical outcomes[5]. Yet HC seems to provide less decompression volume compared with DC[4,6].

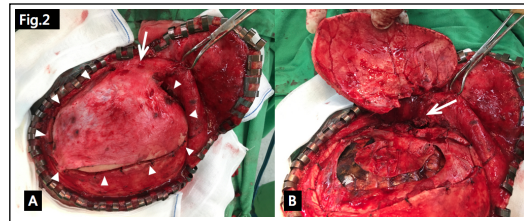
Hereby, we designed a novel surgical method – decompressive cranioplasty for larger decompressive volume and less complication.



(Fig.1) Complications of decompressive craniectomy (A) subdural effusion (B) sinking skin flap syndrome

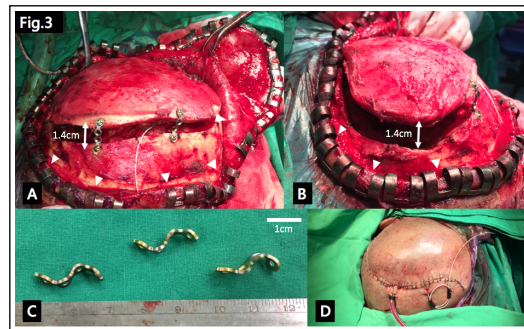
Methods

In decompressive cranioplasty, Agnes Fast craniotomy[2] was adopted. Without cutting or separating the temporalis muscle from the underlying boneflap, Agnes Fast craniotomy offers a valid, simple, and fast way with less blood loss. Besides, the need for an interfascial dissection is circumvented.



(Fig.2) Agnes Fast craniotomy (A) The temporalis muscle and pericranium were attached to boneflap (Arrowhead) (B) The boneflap was fractured at temporal region without transection of temporalis muscle and pericranium (Arrow)

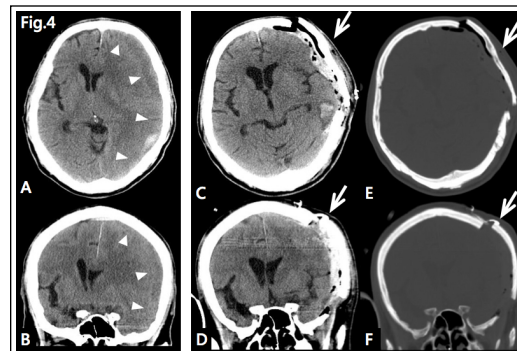
This method benefits more in emergent cases for its simple and rapid exposure of the dura. Z-shaped Titanium miniplates were designed and applied for ensuring the fixed height (>1cm) and decompression volume. Before fixing boneflap, dural tentings, epidural drain and ICP monitor(optional) should be set. Before scalp was sutured, surrounding subgaleal space must be undermined for scalp stretching.(Fig.3)



(Fig.3) (A)(B) The boneflap was fixed 1.4cm higher than it was. Surrounding subgaleal space must be undermined for scalp stretching(Arrowhead). (C) Z-shape titanium miniplates (D) post-operative appearance

Results

We have performed decompressive cranioplasty on three emergent cases - two traumatic subdural hemorrhages and one malignant cerebral infarction. The post-operative brain computed tomography revealed adequate decompression. Three patients were all in good clinical recovery and received following reverse cranioplasty under intravenous general anesthesia within one week without complications. Sinking skin flap syndrome was not observed(Illustration of one traumatic case: Fig.4 and Fig.5). Cosmetic outcome (no temporal hollowing) and mastication functional outcome were satisfied by the patient. Boneflap preservation cost was also saved. Long-term follow-up for boneflap shrinkage and hydrocephalus is underway.

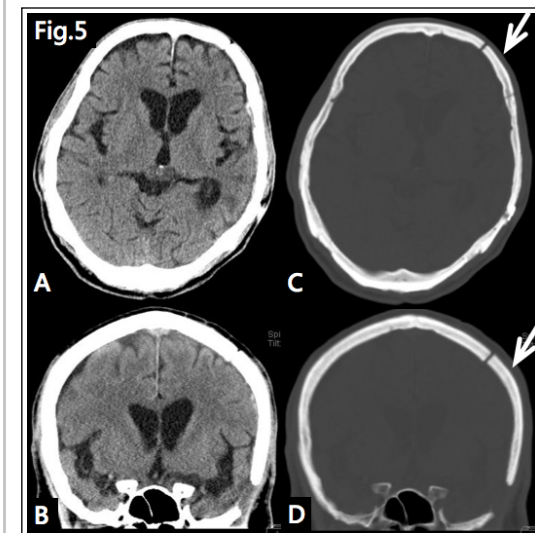


(Fig.4) (A)(B)Pre- and (C)(D)post-decompressive cranioplasty brain CT(with some epidural collection); (E)(F)post-op brain CT in bone window

Conclusions

(1) Decompressive cranioplasty is a promising and effective method in providing good post-operative ICP control and well early clinical outcomes.

(2) Furthermore, better cosmetic result, reduced cost, and less complication may surpass the traditional craniectomy.
(3) Long-term follow-up and perspective study were needed.



(Fig.5) (A)(B)Post-reverse cranioplasty brain CT; (C)(D)CT in bone window

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