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"Paracentral Hitches "A Novel Technique to Avoid Drastic Complication like Post Cranioplasty Extradural Hematoma"

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Abstract

Introduction : Cranioplasty is not merely a cosmetic repair of cranial defects, it is part of rehabilitation process following a patient's neurological injury. Extradural hematoma (EDH) following Cranioplasty is rare but associated with significant morbidity and mortality. The incidence of post cranioplasty EDH ranges from 2% to 12%.Therefore it is of paramount importance to understand, prevent, and treat the complications as they arise.

Aim and Objective : To show multiple dural tenting technique is effective in preventing post cranioplasty EDH. To show Paracentral hitches along with central hitches minimizes the occurrence of post cranioplasty EDH.

Conclusion : Cranioplasty is one of the common surgery performed in trauma settings. Even though considered simple surgery, cranioplasty is associated with high complication rates. Paracentral hitches along with central hitches minimizes the occurrence of post cranioplasty EDH.

Keywords : Cranioplasty, Paracentral hitches, EDH

Introduction : Cranioplasty is not merely a cosmetic repair of cranial defects, it is part of rehabilitation process following a patient's neurological injury.Recent studies have shown that cranioplasty may improve the patient's psychological status, social performance, neurocognitive functioning[1].The factors that contribute to periprocedural complication needs to be thoroughly evaluated. Acute neurological deterioration following cranioplasty can be due to various complication. Various complications which may follow after cranioplasty were as follows: Post-cranioplasty hydrocephalus, Post-cranioplasty hematoma, Superficial and deep infection, New-onset seizure, Subgaleal fluid collection, Bone desorption, Wound dehiscence. Extradural hematoma (EDH) following Cranioplasty is rare but associated with significant morbidity and mortality. The incidence of post cranioplasty EDH ranges from 2% to 12%[2].Therefore it is of paramount importance to understand, prevent, and treat The Complications As They Arise.

Aim and Objective : To show multiple dural tenting technique is effective in preventing post cranioplasty EDH. To show Paracentral hitches along with central hitches minimizes the occurrence of post cranioplasty EDH.

Material and Methods : An analysis of 10 cases of cranioplasty operated over a period of 8 months was done. These cases were admitted between December 2015 - July 2017. All patients were evaluated by Non

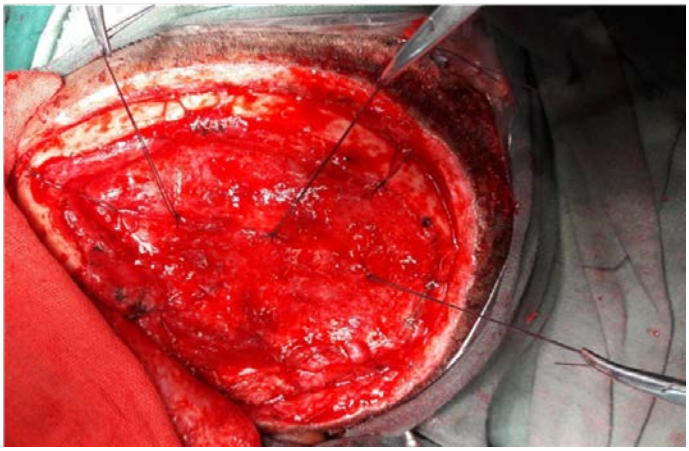
contrast CT scan with 3 D reconstruction. Data included - Age at time of cranioplasty (years), Sex (male or female), Medical co morbidities (hypertension, diabetes, and tobacco use), Indications for craniectomy (trauma, stroke, infection),Time between craniectomy and cranioplasty (days), Type of prosthesis if used (autologus bone, titanium), Glasgow Coma scale at the time of head injury and at the time of cranioplasty.

Inclusion criteria : Size of craniotomy defect >7 cm with concave dura/ falling dura in the CT scan.

Exclusion criteria : Patients with tense brain.

Surgical Techniques: During this procedure, incision was made on previous scar and then dissected all around to reach the proper plane, Status of the brain checked to ensure whether it is tense or relaxed.If the brain found to be relaxed or the dura found to be falling down in a concave manner, a single central hitch given in the middle of the concave falling dura. 2 to 4 Paracentral hitches were given by the side of previous central hitches, making a altogether of total 3 – 5 near central hitches. If the bone is present in abdominal pockets, then the bone is retrieved from abdominal pockets and then the retrieved bone kept in proper alignment with the remaining bony defect to regain the skull contour.Marking made over the retrieved bone one at the centre and 2/4 other marking on either side of centre, then over each marking, 2 drill holes 0.5 cm apart were made by using pneumatic drill close to each other, repeated over rest other marking , then the sutures from central and paracentral hitches passed through these holes accordingly and the dural hitches tied. If the bone was discarded as in case of large compound depreesed fracture the the similar procedure adopted over titanium mesh.These central and paracentral hitches helps in making the dura convex, the convex dura acquires a shape of multiple tents hanging from the bone. so this procedure was also given a name of “Multiple Tent Technique” . By using this technique we leave very minimal dead space which is responsible for future fluid or blood collection. Now the autologus bone or titanium mesh was fixed with remaining skull with miniplate and screw.

2 PARACENTRAL HITCH TECHNIQUES



2 PARACENTRAL HITCH TECHNIQUES

FINAL PICTURE AFTER TAKING 2 PARACENTRAL HITCHES, MAKING ALL TOGETHER 3 HITCHES

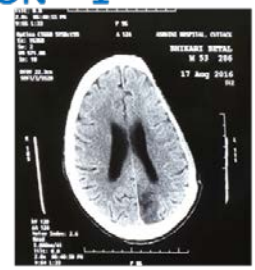
4 PARACENTRAL HITCH TECHNIQUES

4 PARACENTRAL HITCH TECHNIQUES

FINAL PICTURE AFTER TAKING 4 PARACENTRAL HITCHES, MAKING ALL TOGETHER 5 HITCHES

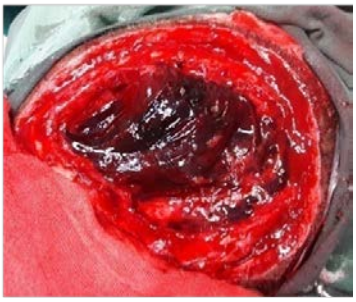
Case Description: A 53-year-old male presented with a post decompresive craniotomy defect for Cranioplasty. Patient underwent decompressive craniotomy 2 months back. He was planned for cranioplasty and undergone the procedure. During the procedure the bone was retrieved from abdominal pockets, incision was made on previous scar and then dissected all around to reach the proper plane, brain was found to be relaxed, dura was falling down in a concave manner, a single central hitch was given through the retrieved bone and then the retrieved bone kept in proper alignment and then the bone was fixed with miniplate and screw.Pt clinical condition on POD 1 does not show any improvement and then his condition started detoriating. His post op CT scan shows a large hyperdense area along with pneumocephalus associated with midline shift and mass effect, and with this pt was again plan for reexploration. During operation after removing the miniplate and screw , a large extradural hematoma was found underneath the bone, central hitch which we had given was found to be insufficient for making dural margin convex, so there occurs blood collection which manifested in the form of post cranioplasty EDH. EDH was evacuated 2 more paracentral hitches were given by the side of previous central hitches so making a altogether of total 3 near central hitches .Now the reposed craniotomy bone is fixed with remaining skull with miniplate and screw.

CASE DESCRIPTION - 1



CRANIOTOMY DEFECT

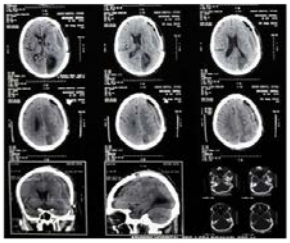
EDH COLLECTION POST OP CRANIOPLASTY



EDH FOLLOWING CRANIOPLASTY

MULTIPLE TENTING TECHNIQUES

2- PARACENTRAL HITCHES



POST OP SCAN

CASE DESCRIPTION - 2

CRANIOTOMY DEFECT

MULTIPLE TENTING TECHNIQUES

4 - PARACENTRAL HITCHES

Observations : Analysying 10 cases of cranioplasty with multiple dural tenting techniques - Age distribution : 1 – 14 yrs – 1 cases, 15 – 49 yrs – 7 cases, 50 – 69 yrs – 3 cases. Mean age distribution of pt undergoing cranioplasty is 40.3 years. Sex distribution : Males – 6 cases, Females – 4 cases. Indications for craniectomy : Decompressive Craniectomy – 8 cases, Large compound depressed fractured where infected bone is discarded – 2 cases. Types of material used for cranioplasty Autologus bone used in 8 cases.Titanium mesh used in 2 cases. Mean GCS score at the time of Decompressive craniectomy is 8.9, Cranioplasty is 14.6. Mean duration between decompressive craniectomy and cranioplasty is 168 days.

Discussion : Cranioplasty is more than a cosmetic repair of cranial defects; it is part of the rehabilitation process following a patient's neurological injury. Cranioplasty is associated with a relatively high overall complication rate, estimated between 15% and 36.5%. Post-operative hematomas requiring surgical evacuation after Cranioplasty occur in 2-12 % of cases in the literature . Furthermore, 25%–76% of patients with post cranioplasty complications may need additional procedures to correct these complications. Central hitch is the basic and age old method in cranioplasty to prevent post cranioplasty extradural fluid collection. But sometimes this may be ineffective to prevent this complication. If dura is found to be excessively falling i.e. is more concave, then the central hitch must be supplanted by paracentral hitches . 2 to 4 paracentral hitches were given by the side of previous central hitches so as to make the dura convex, the convex dura acquires a shape of multiple tents hanging from the bone, so as to leave very minimal dead space which is responsible for future fluid or blood collection, so this procedure was also given a name of "multiple tent technique". This novel technique along with central hitch minimizes the occurrence of post cranioplasty EDH by making the dura more convex and making it adherent to inner surface of retrieved craniotomy bone.

Some studies : Zhao J et al shows both dural tenting suture and epidural drainage are effective in preventing epidural hematoma. **Winston KR et al** shows that dural tenting sutures continue to have an important role in neurosurgery; however, there is no compelling evidence to support their traditional prophylactic use in every intracranial operation.

Conclusion : Cranioplasty is one of the common surgery performed in trauma settings. Even though considered simple surgery, cranioplasty is associated with high complication rates. Paracentral hitches along with central hitches minimizes the occurrence of post cranioplasty EDH.

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