ALNAHRAIN UNIVERSITY COLLEGE OF MEDICINE

The evaluation of monomeric acrylic used in cranioplasty for management of skull defect

supervisor :- Dr. Yasir Hamandi

Done by :- Abdul-Sahib Haider Sahib

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بسم الله الرحمن الرحيم

نرفع درجات من نشاء

و فوق كل ذي علم

عليم

صدق الله العظيم

Acknowledgment

First I should like to express my deep thanks to thw Almighty

God, ALLAH JALLA JALALUHU ,for what I have been done .

Prays and peace to our messenger **Mohammed**

Word will not be enough to express my deep gratitude and special appreciation to my supervisor

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I would like to convey my thanks to my dear father and mother for

their support , patience and encouragement.

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ABSTRUCT

Background

Cranioplasty is the surgical intervention to repair cranial defects in both cosmetic and functional way.

Patients and Methods

A retrospective study done at Imamain Alkadhmain teaching hospital with a review of a cases from 2017-2018 . A total number of 20 cases (17 was male and only 3 was female) where admitted for cranioplasty after a head trauma, bullet injury or a shell.

Results

A20 case were collected retrospectively from Alkadhmia teaching hospital, analysis of the data reviled amedian age 20 years old, most patient were male, admitted for cranioplasty between the years 2017-2018. The leading primary pathology was head trauma followed by bullet injury and a shell.

Discussion

In this study we found that the most patient were male, it may related to our society and life situation which suppose that males are more contact with the environment. Most common indication for cranioplasty was head trauma then bullet injury. The most common site was frontal bone then parietal bon.

Conclusions

Head trauma is the most common cause of skull defect. The incidence of cranioplasty more in males than females, because the incidence of head trauma with skull defect more in males .

Recommendation

Using a new designed material in surgical treatment decreasing the time of surgery which in turn decreasing complications and surgical risk .

Key words

Cranioplasty, Skull defect, Monomeric acrylic

Introduction

Cranioplasty is the surgical intervention to repair cranial defects in both cosmetic and functional way. The history of cranioplasty dates back to 7000 B.C (1). Archeologic findings proved that the use of inorganic materials for cranioplasty had begun before the organic materials(1). In 19th , the use of bone from different donor sites, such as ribs or tibia gained wide population. Although many different methods had been described, there is still no consensus on which method is better. In this article, the principle materials and techniques of cranioplasty are reviewed.

Indications and Timing in Cranioplasty

Cranioplasty is a surgical repair of a defect or deformity of skull performed mostly after traumatic injuries (either contaminated compound depressed skull among civilians, penetrating head injuries among military personnel) with children younger than 3 years old, growing skull fractures and congenital anomalies are common cause, or due to excision of tumors (osteoma, menngiomas, ect..) or from infections (osteomyelitis, infected skull flap) or from aseptic necrosis of skull flaps, from congenital absence of portions of skull or from external decompressions to decrease cerebral swellings due to (trauma, brain tumor, lead intoxication) (2).

In all age groups, tumor removal or decompressive craniectomies are mostly the cause of crania defects. The aim of cranioplasty is not only cosmetic issue ; also, the repair of cranial defects gives relief to psychological draw backs and increases the social performances and neurological improvement and can be explained by improvement of cerebral haemodynamics(3). sometimes cranioplasty should be done to protect the patient from cerebral seizures, to relieve the syndrome of trephine ((consisting of headaches,dizziness,intolerance of vibration and noise , irritability, fatigability, loss of motivation and concentration , depression and anxiety))(2). To protect the brain from direct atmospheric pressure and to correct the shift of central structures , however these are not

generally accepted as an indication for cranioplasty(4). Moreover, the incidence of epilepsy is shown to be decreased after cranioplasty(5). Nowadays, decompressive craniectomies are the most common neurological procedure requiring a future cranioplasty and they are usually performed after severe head trauma or severe cerebrovascular events.

Performing a cranioplasty and thus reconstructing the skull after a DC poses a challenge to neurosurgeons, plastic reconstructive surgeons, and maxillofacial surgeons since the procedure often comprises very large skull defects, postoperative infections (due to foreign material implantations), subdural or epidural accumulations, seizures, postoperative hemorrhage, CSF leaks, and or neurological deficits(6). The present observations demonstrate that chronic decompressive craniectomy not only impair postural blood flow regulation in the brain as whole, cranioplasty improves both parameters, where as only minor effects were observed regarding resting blood flow. Accordingly cranioplasty resulted in marked improvement of metabolic activity, not only in the decompressed hemisphere but also in the contralateral hemisphere(4).

Contraindication

for cranioplasty are the presence of :

- hydrocephalus,

- infection

-brain swelling.

- In children below 4 years old, if there is an intact dura mater, cranium can achieved self closure. Waiting to perform cranioplasty is important to prevent the development of devitalized Autograft or allograft infections. It is generally accepted to wait 3 to 6 months before reconstructive surgery. If there is an infected area, this waiting period can be as long as one year.

Aim

To evaluate a new surgical material used in treating skull defect

Method

A retrospective study done at Alkadhmia teaching hospital with a review of a cases from 2017-2018 . A total number of 20 cases (17 was male and only 3 was female) where admitted for cranioplasty after a head trauma, bullet injury or a shell, the patient ages were between 4-36 years old. The type of implant used in our hospital was monomeric acrylic. The data collected was the patient age, gender, the indication of cranioplasty and the site where the cranioplasty was done.

Result

A 20 case were collected retrospectively from Alkadhmia teaching hospital, analysis of the data reviled a median age 20 years old, 85% (no=17) were male and 15% (no=3) were female (chart 1), admitted for cranioplasty between the years 2017-2018. The leading primary pathology was head trauma in 65% (no=13) followed by the bullet injury 30% (no=6) and a shell injury 5% (no=1) (chart 2) (table 1). Most of the patient who admitted because of head trauma were male and mostly between the ages of below 12 years old and between 12-20 years old (table 2,3), for the patient who admitted because bullet injury were male and mostly between the ages 20-30 years old (table 2,3), while the patient that admitted because of the shell was one male of a age between 20-30 years old (table 2,3). All patient admitted for reconstructive procedure after 8 months and one year one year after initial operation which involve the removal of the bone piece of a depressed fracture, the implant used was monomeric acrylic. The study reveled that the most common site of for cranioplasty is frontal bone 65% (no=13) for al primary pathology then in parietal bone 35% (no=7) (table 4,5).

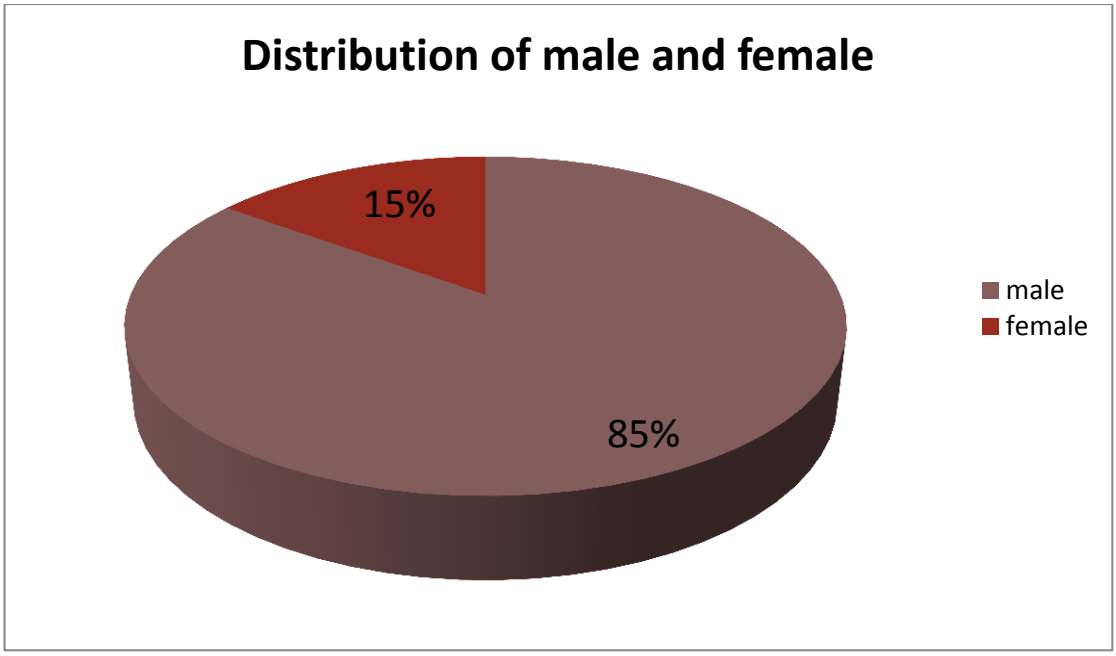

chart (1) : distribution of male and female

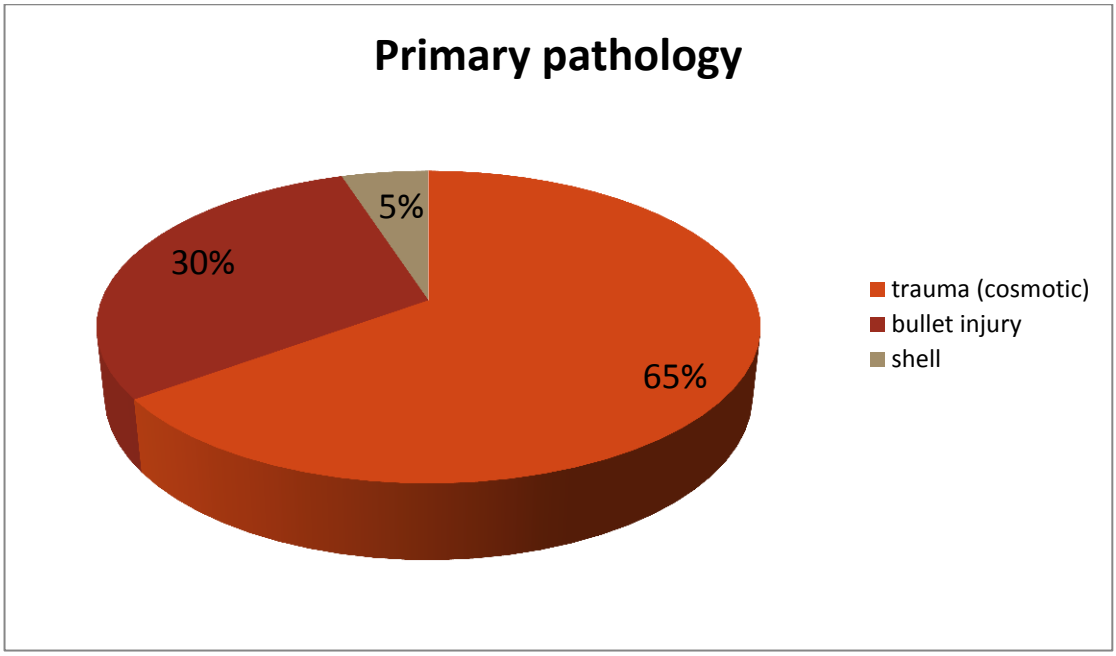

chart (2) : indication of cranioplasty

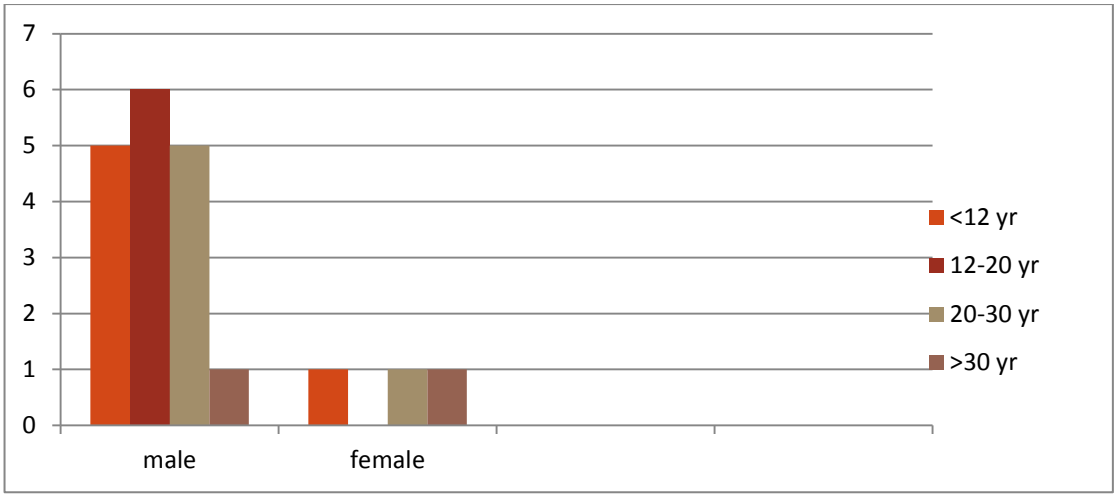

chart (3) : age for gender distribution

primary pathology	No of cases	%
head trauma	**13**	**65**
Bullet injury	**6**	**30**
shell	**1**	**5**
total	**20**	**100**

Table (1) : indication of cranioplasty

gender	primary pathology			total	
	head trauma	bullet injury	shell	NO	%
male	11	5	1	17	85
female	2	1	0	3	15
total	13	6	1	20	100

Table (2) : gender for indication

Age/yr	primary pathology			Total	
	head trauma	bullet injury	shell	NO	%
<12	5	1	0	6	30
12-20	5	1	0	6	30
20-30	1	4	1	6	30
>30	2	0	0	2	10
total	13	6	1	20	100

Table (3) : age for indication

site	NO	%
frontal	13	65
parietal	7	35
total	20	100

Table (4) : site of cranioplasty

pathology	site				total	
	frontal	%	parietal	%	NO	%
trauma	12	60	1	5	13	65
bullet injury	1	5	5	25	6	30
shell	0	0	1	5	1	5
total	13	65	7	35	20	100

Table (5) : indication for site

Discussion

In our study we found most patient were male similar to other study which were also male [7,8,9,10,11]. It may be related to our society and life situation which suppose that males are more contact with outside environment . Most common indication for cranioplasty was head trauma between the age of <12 and 12-20 years and the bullet injury mostly between the age of 20-30. Other study in Hi-Tech medical college and Bhubaneswar in India had road traffic accident was the most common indication[11] but most of other studies found that head trauma was the most common indication similar to our result[7,8,9,10,11,12] which was head trauma, other indication was CVA due to subarchnoid hemorrhage[8,9,12] , brain tumor [7,12] or infection[7,8,12] this can be explained by the adult person more involved in environmental condition this was regarding head trauma. Our most common site is frontal bone as same as the other studies.

Conclusion

Head trauma is the most common cause of skull defect. The incidence of cranioplasty more in males than females, because the incidence of head trauma with skull defect more in males . Using a new designed material in surgical treatment decreasing the time of surgery which in turn decreasing complications and surgical risk .

Recommendation

Using a new designed material in surgical treatment decreasing the time of surgery which in turn decreasing complications and surgical risk.

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