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Article

RETROSPECTIVE SINGLE-CENTRE DESCRIPTIVE STUDY OF CHARACTERISTIC AND MANAGEMENT OF PAEDIATRIC VS ADULT PATIENTS PRESENTING WITH CRANIOMAXILLOFACIAL FRACTURE

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ABSTRACT

Introduction: Pediatric facial fractures are recognized as separate entities from those occurring in the adult. They differ significantly in their epidemiology, diagnosis and treatment. An understanding of the cause, severity, and distribution of maxillofacial and skull vault trauma and associated injuries can assist in establishing clinical and research priorities for prevention and effective treatment of these injuries. Because there were no studies of maxillofacial injuries in a large series in Cipto Mangunkusumo Hospital, we retrospectively analyzed the characteristics of facial injury treated at our hospital from January 2009 to December 2013.
Method: This research is a descriptive study to calculate and compare pediatric and adult maxillofacial fractures between 2009 until 2013. Total sampling of all medical record of maxillofacial trauma patient who came to Cipto Mangunkusumo Hospital form January 2009 until December 2013 was recorded. All data including age, gender, distribution of fracture site, etiology of fracture and fracture treatment were noted. Severity of mandibular and midface fracture also recorded along with their specific fracture distribution.
Results: We recorded 409 patients with Craniomaxilofacial (CMF) injuries for 5 previous years that being treated in Cipto Mangunkusumo Hospital. 17.6%(72) of these patients were pediatrics patient with age younger than 18 years old. From the gender distribution we can see that most of the patient were male (85.3%) with motorcycle as the main cause of trauma (75.6%). We can also see that midface fractures was highly suffered not only in adult patient but also in the pediatrics (58.7%) with orbital, nasal and zygomatic complex fractures as the top three most common fracture site. As for isolated mandible fractures share 22.7% from total fractures, and 18.6% suffered from both midface and mandible fracture. From all of these trauma patients, only 42.3% underwent open reduction and internal fixation surgery, while 28.9% refuse treatment.
Conclusion: Maxillofacial trauma is not common in children; however, the incidence is increasing in this country. Although the principles of treatment follow as the adult's, a few special considerations have to be taken into account in order to improve quality of life of the child in both short and long term. A multidisciplinary approach in the management is therefore highly recommended. Preventive measures and treatment plans in children and adult should be designed while keeping in mind their difference.

***Keywords**: Maxillofacial; Trauma; Fracture*

Latar Belakang: Fraktur wajah pada anak-anak diakui sebagai entitas yang terpisah dari yang terjadi pada orang dewasa. Fraktur wajah pada anak-anak berbeda secara signifikan dalam epidemiologi, diagnosis, dan perawatannya. Pemahaman mengenai penyebab, tingkat keparahan, dan distribusi trauma pada wajah dan tengkorak serta cedera terkait dapat membantu dalam menentukan prioritas klinis dan penelitian untuk pencegahan dan perawatan yang efektif terhadap cedera tersebut. Karena tidak ada studi mengenai cedera maxillofacial dalam jumlah besar di Rumah Sakit Cipto Mangunkusumo, kami menganalisis secara retrospektif karakteristik cedera wajah yang ditangani di rumah sakit kami dari Januari 2009 hingga Desember 2013.
Metode: Penelitian ini adalah studi deskriptif untuk menghitung dan membandingkan fraktur maxillofacial pada anak-anak dan dewasa antara tahun 2009 hingga 2013. Semua rekam medis pasien trauma maxillofacial yang datang ke Rumah Sakit Cipto Mangunkusumo dari Januari 2009 hingga Desember 2013 dicatat dengan metode pengambilan sampel total. Semua data, termasuk usia, jenis kelamin, distribusi lokasi fraktur, etiologi fraktur, dan pengobatan fraktur dicatat. Tingkat keparahan fraktur mandibula dan fraktur midface juga dicatat bersamaan dengan distribusi fraktur spesifiknya.

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Hasil: Kami mencatat 409 pasien dengan cedera kraniomaksilofasial (CMF) selama 5 tahun terakhir yang dirawat di Rumah Sakit Cipto Mangunkusumo. Sebanyak 17,6% (72) dari pasien-pasien tersebut adalah pasien pediatrik dengan usia di bawah 18 tahun. Dari distribusi jenis kelamin, terlihat bahwa sebagian besar pasien adalah laki-laki (85,3%), dengan sepeda motor sebagai penyebab trauma utama (75,6%). Kami juga melihat bahwa fraktur midface banyak dialami tidak hanya oleh pasien dewasa tetapi juga oleh pasien pediatrik (58,7%), dengan fraktur orbital, nasal, dan kompleks zygomatik sebagai tiga lokasi fraktur yang paling umum. Fraktur mandibula yang terisolasi menyumbang 22,7% dari total fraktur, dan 18,6% mengalami fraktur kombinasi midface dan mandibula. Dari semua pasien trauma ini, hanya 42,3% yang menjalani operasi reduksi terbuka dan fiksasi internal, sementara 28,9% menolak perawatan.
Kesimpulan: Trauma maxillofacial tidak umum terjadi pada anak-anak; namun, insidensinya sedang meningkat di negara ini. Meskipun prinsip-prinsip perawatan mengikuti prinsip yang sama dengan pada orang dewasa, beberapa pertimbangan khusus perlu diperhatikan untuk meningkatkan kualitas hidup anak baik dalam jangka pendek maupun jangka panjang. Oleh karena itu, pendekatan multidisiplin dalam penanganan sangat dianjurkan. Langkah-langkah pencegahan dan rencana perawatan pada anak-anak dan dewasa harus dirancang dengan mempertimbangkan perbedaan di antara keduanya.

Kata Kunci: *Maksilofasial; Trauma; Fraktur*

Conflicts of Interest Statement:
The author(s) listed in this manuscript declare the absence of any conflict of interest on the subject matter or materials discussed.

INTRODUCTION

Pediatric facial fractures are recognized as separate entities from those occurring in the adult. They differ significantly in their epidemiology, diagnosis and treatment. The pediatric population is defined by the Indonesian Pediatric association as those younger than 18 years of age.[1,2]

In the epidemiologic study of trauma, the etiology of maxillofacial trauma varies from one country to another because of different social, cultural, and environmental conditions. Globally, the main causes are road traffic accident, assault, fall, and sport injury. The clinical characteristics of trauma change with social circumstances, geopolitical upheaval, technologic advances, and environmental changes. Numerous surveys of facial injuries have shown that the incidence and pattern of fractures of the maxillofacial region have changed during the years.[1]

An understanding of the cause, severity, and distribution of maxillofacial and skull vault trauma and associated injuries can assist in establishing clinical and research priorities for prevention and effective treatment of these injuries.[2]

Because there were no studies of maxillofacial injuries in a large series in Cipto Mangunkusumo Hospital, we retrospectively analyzed the characteristics of facial injury treated at our hospital from January 2009 to December 2013, to determine their demographic, principal causes, craniofacial fractures distribution and their management.

METHOD

This research is a descriptive study to calculate and compare pediatric and adult maxillofacial fractures between 2009 until 2013. Total sampling of all medical record of maxillofacial trauma patient who came to Cipto Mangunkusumo Hospital form January 2009 until December 2013 was recorded. All data including age, gender, distribution of fracture site, etiology of fracture and fracture treatment were noted. Severity of mandibular and midface fracture also recorded along with their specific fracture distribution.

RESULTS

We recorded 409 patients with Craniomaxilofacial (CMF) injuries for 5 previous years that being treated in Cipto Mangunkusumo Hospital. 17.6%(72) of these patients were pediatrics patient with age younger than 18 years old (Chart 1). From the gender distribution we can see that most of the patient were male (85.3%) with motorcycle as the main cause of trauma (75.6%) (Chart 2, Tabel2). We can also see that

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midface fractures was highly suffered not only in adult patient but also in the pediatrics (58.7%) with orbital, nasal and zygomatic complex fractures as the top three most common fracture site. As for isolated mandible fractures share 22.7% from total fractures, and 18.6% suffered from both midface and mandible fracture. From all of these trauma patients, only 42.3% underwent open reduction and internal fixation surgery, while 28.9% refuse treatment. The remaining patient underwent conservative treatment including closed reduction, dental occlusion fixation (MMF) and observations.

Chart 1. Age Distribution

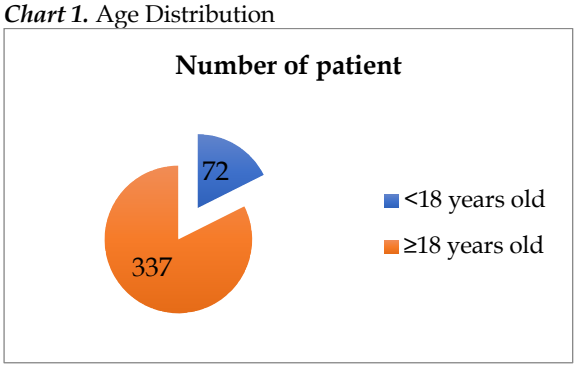
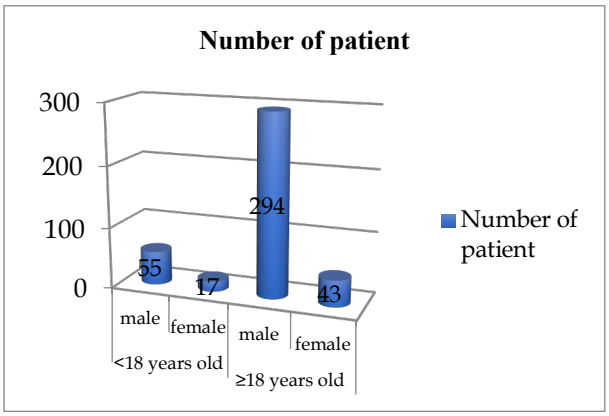


Chart 2. Gender Distribution



Tabel 1. Distribution of fracture site

		Number of fracture			Number of fracture
Pediatric <18	Mandible	21 (20.39%)	Adult ≥ 18	Mandible	82 (79.61%)
	Middle third	45 (18.75%)		Middle third	195 (81.25%)
	Mandible + middle third	6 (9.09%)		Mandible + middle third	60 (90.91%)
	Total	72 (17.60%)		Total	337 (82.40%)

Tabel 2. Distribution of fracture etiology

	Etiology	Number of fracture		Etiology	Number of fracture
Pediatric < 18	Motorcycle	53 (17.15%)	Adult ≥ 18	Motorcycle	256 (82.85%)
	*With helmet	14 (9.27%)		*With helmet	137 (90.73%)
	*Without helmet	39 (21.55%)		*Without helmet	142 (78.45%)
	Motor vehicle	3 (17.65%)		Motor vehicle	14 (82.35%)
	Assault	5 (20%)		Assault	20 (80%)
	Sports	4 (17.40%)		Fall	19 (82.60%)
	Fall	7 (38.89%)		Work related accident	11 (61.11%)
	Other	0 (0%)		Hit by motor vehicle	17 (100%)
	Total	72 (17.60%)		Total	337 (82.40%)

Tabel 3. Distribution of fracture management

	Fracture site	Refuse treatment	Conservative management	Surgical management
Pediatric <18	Mandible	4 (16.67%)	7 (35%)	10 (17.24%)
	Midface	6 (8.57%)	19 (20.88%)	18 (24.32%)
	Mandible + Midface	3 (12.5%)	2 (50%)	3 (7.32%)
	Total	13 (11.02%)	28 (24.35%)	31 (17.92%)
Adult ≥ 18	Mandible	20 (83.33%)	13 (65%)	48 (82.76%)
	Midface	64 (91.43%)	72 (79.12%)	56 (75.68%)
	Mandible + Midface	21 (87.5%)	2 (50%)	38 (92.68%)
	Total	105 (88.98%)	87 (75.65%)	142 (82.08%)

Tabel 4. Severity of mandibular fracture

	Severity	Number of fracture		Severity	Number of fracture
Pediatric <18	Single fracture	12 (13.95%)	Adult ≥ 18	Single fracture	74 (86.05%)
	Double fractures	13 (21.31%)		Double fractures	48 (78.69%)
	Triple fractures or more	2 (9.09%)		Triple fractures or more	20 (90.91%)
	Total	27 (15.98%)		Total	142 (84.02%)

Tabel 5. Specific distribution on mandible fracture 2009-2013

	Mandibular fractures	Number of fracture		Mandibular fractures	Number of fracture
Pediatric <18	Condyle	12 (27.27%)	Adult ≥ 18	Condyle	32 (72.73%)
	Symphysis	17 (14.53%)		Symphysis	100 (85.47%)
	Body	5 (10.20%)		Body	44 (89.80%)
	Angle	4 (14.29%)		Angle	24 (85.71%)
	Ramus	2 (18.18%)		Ramus	9 (81.82%)
	Coronoid	0 (0%)		Coronoid	2 (100%)
	Alveolar	13 (56.52%)		Alveolar	10 (43.48%)
	Total	44 (16.60%)		Total	221 (83.40%)

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Tabel 6. Severity of midface fracture

	Severity	Number of fracture		Severity	Number of fracture
Pediatric <18	Single fracture	31 (18.79%)	Adult ≥ 18	Single fracture	134 (81.21%)
	Double fractures	11 (14.10%)		Double fractures	67 (85.90%)
	Triple fractures or more	9 (14.29%)		Triple fractures or more	54 (85.71%)
	Total	51 (16.67%)		Total	255 (83.33%)

Tabel 7. Specific Distribution on midface fracture

	Midface fractues	Number of fractures		Midface fractues	Number of fractures
Pediatric <18	ZCF	11 (10.09%)	Adult ≥ 18	ZCF	98 (89.91%)
	Arch	4 (7.55%)		Arch	49 (92.45%)
	Lefort I	2 (18.18%)		Lefort I	9 (81.82%)
	Lefort II	1 (6.67%)		Lefort II	14 (93.33%)
	Lefort III	0 (0%)		Lefort III	3 (100%)
	Sagittal	0 (0%)		Sagittal	0 (0%)
	NOE	2 (14.29%)		NOE	12 (85.71%)
	Nasal	24 (27.91%)		Nasal	62 (72.09%)
	Orbital	24 (20.17%)		Orbital	95 (79.83%)
	Ethmoid	0 (0%)		Ethmoid	12 (100%)
	Maxilla	6 (7.41%)		Maxilla	75 (92.59%)
	Alveolar	5 (27.78%)		Alveolar	13 (72.22%)
	Palate	0 (0%)		Palate	1 (100%)
	Total	79 (15.13%)		Total	443 (84.87%)

DISCUSSION

In Cipto Mangunkusumo Hospital, the etiology of trauma in pediatric population is similar to adult, with motorcycle accident being the most common, particularly involving boys and man. This is probably attributed to the high use of motorcycle as the main vehicle for transport to work and school among Indonesians. Among all motorcycle accident, most of the riders not using helmet as a protector, this also can be the reasons of high facial fractures.[1] In Indonesia, the age to obtain a rider license is 17 years old; however this study showed that many children below this age were riding illegally which again, is not uncommon in this country.

Theoretically, the higher cranial to facial proportion in children reduces the risk that frontal impact will cause facial fracture, but increases the risk of skull fractures and intracranial injuries. With age the fracture frequency shifts from the upper face (with frontal and orbital fractures more common in the first 5 years of life), to the lower face (with mandible fractures having a higher incidence after 6 years and into adulthood).[2,3] This theory differs from the data that we conclude in Cipto Mangunkusumo Hospital. From this study, we can see that midface fractures outnumbered mandibular fractured both in pediatric and adult population.

This data maybe bias because most of the pediatric patient that was included in this study was older than 12 years old. Developing teeth and sinuses affect the way fractures form. At birth, sinuses have not yet developed and exist only as a bud of mucosa surrounded by cancellous bone. Therefore, the facial skeleton in the child is composed of solid blocks of bone, in contrast to that of the adult skeleton whose sinuses are surrounded by buttresses that dissipate injury leading to more common fracture patterns. This solid architecture makes the pediatric facial skeleton more resistant to trauma and more reliable to unusual fracture patterns. In general, bone bearing mixed dentition is more resistant to fracture.[4]

Regarding the severity of midfacial fracture, most of it was single fractures with the most fractures involved was orbital, nasal and zygoma both in pediatric and adult populations. A review article by Haug and Foss revealed that Le Fort fractures were least common facial fractures encountered in children.[5] Ferrerira et al reaffirmed that Le Fort fractures were found exclusively in patient older than 10 years.[6] Le Fort fractures are most common in the older patients when the paranasal sinuses are fully developed.[7] We did register 2 Lefort 1 fractures and 1 Lefort 2 fractures in Cipto Mangunkusumo Hospital for the last 5 years.

Regarding the severity of mandible fracture, children are prone to single and double fracture at the same percentage, while most of adult suffered from a single mandible fracture.[8] Symphysis fracture was the most common ste fracture both in children (38.6%) and adult (45.2%).

An infant with a minimal fracture does not require operative intervention, while an older child with a grossly displaced comminuted

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fracture is best served with open reduction internal fixation (ORIF). Unfortunately, most patients fall in the large watershed area in between, where the experience and preference of the surgeon will often times determine the course of management. Until further evidence is available to provide accurate guidelines as to the degree of reduction accepted, it rests upon the surgeon to decide for each case individually whether closed or open reduction is warranted, and in doing so consider the degree of displacement, the feasibility of open reduction, and the age of the patient.[8] In this study, majority of the fractures in the adult were managed by open reduction (42%). On the other hand, about 43% of the fractures in children were also treated by open surgical approach. These percentages of surgical treatment in pediatric patients were higher compared to other studies abroad. The rate of treatment refusal was high in Cipto Mangunkusumo Hospital; 18.1% in children and 31.4% in adult. This refusal mostly causes by financial problems.

CONCLUSION

Maxillofacial trauma is not common in children; however the incidence is increasing in this country. Although the principles of treatment follow as the adult's, a few special consideration have to be taken into account in order to improve quality of life of the child in both short and long term. A multidisciplinary approach in the management is therefore highly recommended. Preventive measures and treatment plans in children and adult should be designed while keeping in mind their difference.

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REFERENCES

1. Zhang QB, Zhang ZQ, Chen D. Epidemiology of maxillofacial injury in children under 15 years of age in southern China. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115:436-441
2. Naran S, Afifi A, Losee JE. Pediatric facial fractures. Serletti JM, Taun PJ, Wu LC, Slutsky DJ editors. In: Current Reconstructive Surgery. McGrowHill: 2013, p 305-12
3. Zhi Li, Zu-Bing Li. Characteristic changes of pediatric maxillofacial fractures in china during past 20 years. *J Oral Maxillofac Surg 66:2239-2242, 2008*
4. Morris C, Kushner GM, Tiwana PS. Facial Skeletal trauma in the growing patient. Oral Maxillofacial Surg Clin N Am 24 (2012) 351–364
5. Haug RH, Foss J. Maxillofacial injuries in the pediatric patient. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2000;90:126–134
6. Ferreira PC, Barbosa J, Braga JM, Rodrigues A, Silva ÁC, Amarante JM. Pediatric facial fractures. Ann Plast Surg. 2016;77(1):54–60.
7. Zhou HH, Ongodia D, Yang RT, Li ZB. Incidence and pattern of maxillofacial fractures in children and adolescent: A 10 years retrospective cohort study. International Journal of Pediatric Otorhinolaryngology 77 (2013) 494–498
8. Nicole M, Wymann E. Pediatric craniofacial Trauma. *J Oral Maxillofac Surg 66:58-64, 2008*

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