นิพนธ์ต้นฉบับ

การศึกษาอุบัติการณ์ การรักษา และภาวะแทรกซ้อนของผู้ป่วยกระดูกใบหน้าส่วนกลางหัก ในโรงพยาบาลพระปกเกล้าจันทบุรี

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บทคัดย่อ

ที่มาของปัญหา: ผู้ป่วยกระดูกใบหน้าหักพบได้เป็นจำนวนมากในประเทศไทย ส่วนใหญ่มักเกิดกับกระดูกใบหน้าส่วนกลาง ในอดีตเคยมีการศึกษาถึงอุบัติการณ์ของผู้ป่วยที่มีกระดูกใบหน้าหักในโรงพยาบาลพระปกเกล้า แต่เป็นการศึกษาเมื่อ 30 ปีก่อน ซึ่งจำนวนผู้ป่วยและแนวทางการรักษาในปัจจุบันมีความแตกต่างจากในอดีตมาก

วัตถุประสงค์: การศึกษานี้มีวัตถุประสงค์เพื่อรวบรวมข้อมูลผู้ป่วยกระดูกใบหน้าส่วนกลางหัก ที่มารับการรักษาในโรงพยาบาลพระปกเกล้าในปัจจุบัน เพื่อประโยชน์ในการเป็นแหล่งข้อมูลอ้างอิงของโรงพยาบาลในการป้องกันอุบัติเหตุจราจร และเพื่อต่อยอดการทำวิจัยในอนาคต

วิธีการศึกษา: การศึกษานี้เป็น Descriptive retrospective study โดยเก็บข้อมูลจากเวชระเบียนผู้ป่วยที่ได้รับการวินิจฉัยว่ากระดูกใบหน้าส่วนกลางหักในโรงพยาบาลพระปกเกล้าระหว่างเดือนมกราคม พ.ศ. 2559 ถึงเดือนธันวาคม พ.ศ. 2563 ข้อมูลที่เก็บประกอบด้วย เพศ อายุ ประวัติการดื่มแอลกอฮอล์ ประวัติการสวมหมวกกันน็อค พื้นที่ที่เกิดเหตุ ชนิดของกระดูกใบหน้าส่วนกลางที่หัก การบาดเจ็บร่วม การรักษาที่ได้รับ และภาวะแทรกซ้อนหลังการรักษา และใช้ Descriptive statistics เช่น ความถี่ ร้อยละ ในการวิเคราะห์ข้อมูล

ผลการศึกษา: ผู้ป่วยทั้งหมด 2,477 ราย (เพศชาย ร้อยละ 74 เพศหญิง ร้อยละ 26) ช่วงอายุที่พบมากที่สุด คือ 21 - 30 ปี (ร้อยละ 23.6) สาเหตุหลักมาจากอุบัติเหตุจักรยานยนต์ (ร้อยละ 66.8) กระดูกใบหน้าส่วนกลางที่พบว่าหักมากที่สุดคือ Zygomatic bone (ร้อยละ 36.4) การบาดเจ็บร่วมที่พบมากที่สุดคือ ภาวะเลือดออกในสมอง (ร้อยละ 11.7) เดือนที่เกิดเหตุมากที่สุดคือ เดือนธันวาคม พื้นที่ที่เกิดเหตุมากที่สุดคืออำเภอเมืองจันทบุรี ผู้ป่วยส่วนใหญ่ได้รับการรักษาด้วยการผ่าตัด (ร้อยละ 63.8) วิธีการผ่าตัดที่ผู้ป่วยส่วนใหญ่ได้รับคือ การผ่าตัด Open reduction with internal fixation (ร้อยละ 26.9) ภาวะแทรกซ้อนที่พบมากที่สุดคือ จมูกผิดรูป (ร้อยละ 1.1)

สรุป: อุบัติเหตุจักรยานยนต์ยังคงเป็นสาเหตุหลักของการเกิดกระดูกใบหน้าส่วนกลางหักตั้งแต่อดีตจนถึงปัจจุบัน มาตรการที่เข้มงวดในการควบคุมการสวมหมวกกันน็อค การไม่ดื่มเครื่องดื่มแอลกอฮอล์ การจำกัดความเร็วในการขับขี่ ยังเป็นสิ่งจำเป็นเพื่อลดอุบัติการณ์ของกระดูกใบหน้าส่วนกลางหัก โดยเฉพาะในเขตเมืองใหญ่ที่มีประชากรกลุ่มวัยรุ่นและวัยทำงานอาศัยอยู่หนาแน่น

คำสำคัญ: กระดูกใบหน้าหัก, กระดูกใบหน้าส่วนกลางหัก, กระดูกขากรรไกรและใบหน้าหัก, การบาดเจ็บที่กระดูกขากรรไกรและใบหน้า, อุบัติการณ์, ระบาดวิทยา

ORIGINAL ARTICLE

Retrospective Analysis of the Incidences, Treatments and Complications of Mid Facial Fractures in Prapokklao Hospital, Chanthaburi

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ABSTRACT

BACKGROUND: There are a large number of patients with facial fractures in Thailand, mostly at the mid - face. Roughly 30 years ago, incidences of patients with facial fractures at Prapokklao Hospital were studied. The current number of patients and medical guidelines has changed.

OBJECTIVES: This study aimed to collect data of current patients with mid - facial fractures coming for treatment at Prapokklao Hospital, which could be useful as a reference source at the hospital for traffic accident prevention and further extension of research.

METHODS: This was a descriptive retrospective study, in which data was collected from the medical records of patients diagnosed with mid - facial fractures at Prapokklao Hospital between January 2016 and December 2020. The data included sex, age, drinking history, helmet use history, accident area, type of mid - facial fractures, combined injury, treatment, and post - treatment complications. Descriptive statistics were used for data analysis, e.g. frequency and percentage.

RESULTS: There were a total of 2,477 patients (male 74%, female 26%), mostly aged between 21 - 30 years. (23.6%). The major cause was motorcycle accidents (66.8%). The most common type of mid - facial fracture occurred at the zygomatic bone (36.4%). The most common combined injury was intracranial hemorrhage (11.7%). The most common month of accidents was December, and the most common accident area was Mueang Chanthaburi district. The most common treatment was surgery (63.8%). The most common type of surgery was an open reduction with internal fixation (26.9%), while the most common complication was nasal deformities (1.1%).

CONCLUSIONS: Motorcycle accidents remain the major cause of mid - facial fractures from the past up until now. Strict measures on helmet use, no drinking, and speed limits are still highly required to reduce the incidences of mid - facial fractures, particularly in large cities with a high density of teenage and working - age population.

KEYWORDS: facial fracture, mid - facial fracture, maxillofacial fracture, maxillofacial injury, incidence, epidemiology

INTRODUCTION

Facial fractures are frequently found in Thailand, mostly arising from traffic accidents,[1-4] followed by physical attacks, falling from heights, and sports accidents.[5] In the past, incidences of facial fractures were studied in several countries, including Thailand. If classifying the incidences of facial fractures by the levels of facial bones, it was found that they mostly happen to the mid - face (zygoma, maxilla, nasal bone, naso - orbital - ethmoidal bone, orbital bone, palatal bone),[1, 6] followed by the mandible and frontal bone. The treatment guidelines for each level are also different.[4, 5, 7, 8] Besides the high incidences of mid - facial fractures, the anatomy of each particular bone and treatment is also different. Current treatments can be classified as a conservative treatment for mild injuries, non - displaced fractures, and neither functional problems nor cosmetic problems.[4] There are a number of surgical methods available today, including open reduction with internal fixation,[9] closed nasal reduction, open nasal reduction[10], intermaxillary fixation, zygomatic reduction with the Gillies approach, and a craniofacial suspension sling.

At Prapokklao Hospital, the highest proportion belongs to patients with mid - facial fractures among others at the Plastic & Reconstructive Surgery Unit. In the past, a study by Sirirak collected data from patients with facial fractures at Prapokklao Hospital between 1990 and 1992. The data included the number of patients, sex, age, and type of mid - facial fractures, except for other risk factors of mid - facial fractures, e.g. drinking and helmet use. Also, there are much larger numbers of patients diagnosed with mid - facial fractures than in the past, with more various treatments. Therefore, this study mainly focused on the incidences, treatments, and complications of patients with mid - facial fractures at Prapokklao Hospital between January 2016 and December 2020. The secondary objective was to study the causes, the most common month for accidents, the most common accident area, helmet wear history, drinking, seat belt usage, sex, and age; and their relationship with mid - facial fractures. Such data would be useful for planning traffic accident prevention as well as for use as a reference for further research concerning facial fractures.

METHODS

This is a descriptive retrospective study, of which data was collected from medical records at Prapokklao Hospital, Chanthaburi Province. For the inclusion criteria, it referred to patients diagnosed with facial fractures from 1 January 2016 to 31 December 2020. For the exclusion criteria, it referred to patients diagnosed with frontal fractures or mandibula fractures, but no mid - facial fractures, including patients with missing medical records. The diagnosis of mid - facial fractures was based on the International Classification of Diseases, Tenth Edition (ICD - 10). There were a total of 2,477 patients diagnosed with mid - facial fractures. The data included sex, age, drinking history, helmet use history, seatbelt use, accident area, and the month of accidents, as well as length of stay, type of mid - facial fractures, combined injury, treatment, and complications. All data were stored in Microsoft Excel version 2010. Descriptive statistics were used for data analysis, e.g. frequency and percentage. IBM SPSS statistics for Windows version 22 was used for statistical calculation.

This research was approved by the Chanthaburi Research Ethics Committee/Region 6, in compliance with Document no. CTIREC 010, Project no. CTIREC 003/63, on 14 February 2020. Approval was extended on 28 February 2021.

RESULTS

Between 1 January 2016 and 31 December 2020, there were a total of 2,477 patients at Prapokklao Hospital diagnosed with mid - facial fractures. 1,833 were male (74%) and 644 were female (26%), mostly aged between 21 - 30 years, followed by 10 - 20 years (Table 1). The causes of mid - facial fractures were classified as follows: 1,655 patients (66.8%) from motorcycle accidents, followed by 343 (13.85%) from falling from heights, 277 (11.2%) from physical attacks, 164 (6.62%) from car accidents, 22 (0.89%) from sports accidents, and 16 (0.7%) from unknown causes. 830 patients (33.5%) had a history of drinking. 1,540 patients (93.1%) out of 1,655 from motorcycle accidents were not wearing helmets, and 135 patients (82.3%) from car accidents were not wearing seat belts (Table 1).

Table 1 General characteristics of patients

Studied characteristics	Number of patients	Proportion (%)
Sex		
Male	1,833	74
Female	644	26
Age range (in years)		
< 10	30	1.2
10 - 20	522	21.1
21 - 30	584	23.6
31 - 40	434	17.5
41 - 50	384	15.5
51 - 60	278	11.2
61 - 70	150	6.1
> 70	95	3.8
Drinking history		
Yes	830	33.5
No	1,531	61.8
Unknown	116	4.7
Helmet wear history		
Yes	27	1.6
No	1,540	93.1
Unknown	88	5.3
Seatbelt wear history		
Yes	11	6.7
No	135	82.3
Unknown	18	11.0

The most common accident area was Mueang Chanthaburi district, with 699 patients (28.2%). 290 were transferred from other provinces, with 167 from Trat, 24 from Sa Kaeo, and 99 from others (Table 2). 2019 was the year with the maximum number of patients with mid - facial fractures (560), followed by 502 in 2016, and 493 in 2017 and 2018. 2020 was the year with the minimum number of patients (429). When considering by month, December had the maximum patients (271, 10.9%), followed by 241 (9.7%) in November, and 238 (9.6%) in March. September was the minimum with 147 patients (5.9%).

Table 2 Accident area

Accident area	Number of patients	Proportion (%)
Chanthaburi Province		
Mueang District	699	28.2
Khao Khitchakut District	124	5.0
Kaeng Hang Maeo District	148	6.0
Laem Sing District	106	4.3
Pong Nam Ron District	221	8.9
Khlung District	202	8.2
Tha Mai District	300	12.1
Na Yai Am District	98	4.0
Makham District	130	5.2
Soi Dao District	159	6.4
Trat Province	167	6.7
Sa Kaeo Province	24	1.0
Others	99	4.0

The most common type of mid - facial fracture was zygoma, followed by nasal bone (Table 3). The rare type of mid - facial fractures was palate, found in 49 patients (1.4%), and the total patients were found with combined Le Fort 1 factures. In 2,477 diagnosed with mid - facial fractures, 220 were with combined fractures of the mandible (6.3%) and 97 with combined fractures of the frontal bone (2.8%). 1,739 patients (61.2%) were diagnosed with mid - facial fractures without combined injuries. However, the other groups of patients were diagnosed with combined injuries. The most common was intracranial hemorrhage in 333 patients (11.7%), followed by long bone fractures in 275 patients (9.7%), skull fractures in 194 patients (6.8%), chest injuries in 124 patients (4.4%), fractures or dislocations of the cervical spine in 66 patients (2.3%), eye injuries or optic nerve injuries in 61 patients (2.2%), abdominal injuries in 42 patients (1.5%), and lacrimal duct injuries in 7 patients (0.3%).

Table 3 Diagnosis of mid - facial fractures

Diagnosis	Number of patients	Proportion (%)
Zygomatic fracture	1,264	36.4
Le Fort 1 fracture	372	10.7
Le Fort 2 fracture	197	5.7
Le Fort 3 fracture	135	3.9
Nasal fracture	792	22.8
Naso - orbital - ethmoidal fracture	188	5.4
Orbital fracture	161	4.6
Palatal fracture	49	1.4
Frontal fracture*	97	2.8
Mandibular fracture*	220	6.3

*Patients diagnosed with a frontal fracture or mandibular fracture, combined with a mid - face fracture

For treatments, conservative treatments were provided to 1,058 patients (36.2%) and surgery to 1,868 patients (63.8%). The most common surgery was an open reduction with internal fixation in 786

patients (26.8%), followed by a closed nasal reduction in 661 patients (22.5%), as shown in Table 4. All patients were admitted for 6 days each, on average, though 22 (0.9%) patients died during admission. After leaving the hospital, they received follow - up care for 1 month – 3 years. The most common complication was nasal deformities, found in 26 patients (1.1%), followed by trismus in 25 patients (1.0%), diplopia in 16 patients (0.7%), enopthalmos in 14 patients (0.6%), malar asymmetry in 11 patients (0.4%), nasolacrimal duct obstruction in 9 patients (0.4%), wound complication in 8 patients (0.3%), malocclusion in 8 patients (0.3%), facial nerve injury in 6 patients (0.2%), ectropion in 4 patients (0.2%), eyelid ptosis in 2 patients (0.1%), and telecanthus as well as plate exposed in 1 of each (0.1%).

Table 4 Treatments

Treatment	Number of patients	Proportion (%)
Conservative	1,058	36.2
Surgery	1,868	63.8
Open reduction with internal fixation	786	26.8
Intermaxillary fixation	227	7.8
Closed nasal reduction	661	22.5
Open nasal reduction	102	3.5
Zygomatic reduction with the Gillies approach	78	2.7
Craniofacial suspension sling	6	0.2
Transmaxillary K wire fixation	7	0.2
Transnasal wiring	1	0.1

DISCUSSION

There were 2,477 patients with mid - facial fractures at Prapokklao Hospital from 1 January 2016 - 31 December 2020, the highest proportion in the Plastic & Reconstructive Surgery Unit. 1,833 were male (74%) and 644 were female (26%), conforming to most previous studies that showed the proportion of males was 3 - 4 times higher than females[1, 2] because males had higher risks of accidents than females due to a higher prevalence of speeding, drinking, and physical confrontations. Most facial fractures were caused by motorcycle accidents (66.8%), conforming to most Thai and international studies, particularly in developing countries.[1, 2, 11] In patients with facial fractures, those studies pointed out that motorcycle accidents were the first cause. In contrast, developed countries like those in Europe pointed out that most facial fractures were caused by physical confrontations (39%), followed by falling from heights (31%), while traffic accidents accounted for only 11%.[12] Because most developed countries, particularly in Europe, have advanced mass transportation, the use of motorcycles or personal cars is less than in developing countries. In addition, roads in developed countries are much better than in developing ones because they are improved regularly, along with strict speeding laws, high concern for seat belt wear and helmet wear, and controls on drinking while driving. These can hugely reduce traffic accidents in those countries. There were some patients in this study that could not specify the causes of their mid - facial fractures due to unconsciousness and a lack of witnesses. Therefore, no data of such causes were recorded in the medical records. 21 - 30 years was the most common age range for accidents, followed by 10 - 20 years,

similar to previous studies.[1] That age range was the most common for patients with mid - facial fractures because the major cause in Chanthaburi Province and other nearby provinces was motorcycle accidents. 21 - 30 years was the same age range as the working - age, which included a large number of motorcycle users. Speeding behavior and no helmet use among teens also caused a large number of patients in this age range. The most common accident area was Mueang Chanthaburi district because it was the center of education and working, so there should be the high population in the age range of 10 - 30 years. Trat Province was the province that transferred the most patients to Prapokklao Hospital because it was closest to Chanthaburi Province. Therefore, transfer was more convenient and took a shorter time than to other provinces. Unlike Trat Province, although Sa Kaeo Province adjoined to Chanthaburi Province, the distance was farther and the route was more difficult. It was expected that some patients in Sa Kaeo Province were transferred to other provinces nearby, as well. 2020 was the year with the minimum number of patients with mid - facial fractures due to the national lockdown measures between 3 April and 15 June 2020 on account of the COVID - 19 outbreak. Pubs and bars were also restricted in terms of opening times, parallel to stay - home campaigns. Therefore, the statistics of accidents reduced at that time. December was the month with the maximum number of patients with mid - facial fractures because it contained many official holidays and New Year's festivals that contained several celebrations, with drinking, which was a risk factor for accidents. However, the number of patients in April was not much different from other months despite the Songkran festival because Chanthaburi Province did not celebrate for many days like others. Teens mostly celebrated on 12 April and only in particular areas, resulting in easier accident control.

The diagnosis of mid - facial fractures in this research was based on the types of fractures. For maxillary fractures, they were classified into 3 levels according to Rene Le Fort in 1901.[13] It was found that the most common type of mid - facial fracture was a zygomatic fracture (36.4%), followed by a nasal fracture (22.8%). Patients with zygomatic fractures were found the most, conforming to other studies,[1,2] because most Asians have high malar projection. Therefore, zygomatic bones usually break first in the case of accidents, followed by a nasal fracture for with the same reason. That is, nasal bones are the protruding part on the face, and thus they usually get injured more easily than other facial bones in the case of accidents. For palatal fractures, of which incidences have never previously been reported in Thailand, 49 patients in this research were diagnosed with such fractures, combined with Le Fort 1 fracture (13.2% of Le Fort 1 fracture). The proportion was very high. In other countries, only 8 - 13.2% of palatal fractures were reported when comparing with Le Fort 1 fracture.[14] Because most mechanisms of mid - facial fractures in this study were high - velocity mechanisms caused by motorcycle accidents, there were high proportions of patients with Le Fort fractures and palatal fractures.[13] The most common combined injury was intracranial hemorrhage, followed by long bone fractures, skull fractures, and chest injuries. This conformed to international studies.[14] 22 patients died of other combined injuries during admission, particularly intracranial hemorrhage, rather than mid - facial fractures.

In terms of treatment guidelines for patients with mid - facial fractures at Prapokklao Hospital, most patients received surgery by open reduction with internal fixation, with the highest proportion,

followed by closed nasal reduction, and intermaxillary fixation. This conformed to previous studies.[1,2] Moreover, some patients received closed reduction with craniofacial suspension sling, intermaxillary fixation, and transmaxillary K wire fixation. Most of them also had brain injuries and required tracheostomy due to long periods of unconsciousness and bed rest. The proportion of patients receiving conservative treatment was 36.2% because some patients were diagnosed with mid - facial fractures by CT brain without abnormalities of the face; there were no indications for surgery.[4] In the past, there were no studies in Thailand specifying the exact number of mid - face fractures that received conservative treatment. However, the study of Somphon et al.[4] concerning patients with zygomatic fractures receiving conservative treatment found that there were 47.8% of patients out of the total.

After leaving the hospital, most patients received follow - up at 1 month, followed by 3 and 6 months, respectively. Some had post - treatment complications, e.g. nasal deformities usually found after treatment of nasal fracture or a naso - orbital - ethmoidal fracture. Trismus that were usually found after intermaxillary fixation and diplopia or enopthalmos that were usually found after orbital fracture; or naso - orbital - ethmoidal fracture, and nasolacrimal duct obstruction that was usually found after naso - orbital - ethmoidal fracture; and malar asymmetry that was usually found after a zygomatic fracture. Less than 10 patients were found with other complications through all 5 years of data collection, e.g. wound complication, malocclusion, facial nerve injury, ectropion, eyelid ptosis, telecanthus, and plate exposure.

The mid - face is significant to support the functions of major facial organs, e.g. the eyes, nose, and mouth. It also plays a key role in facial beauty. The data obtained from this research confirms a large number of patients diagnosed with mid - facial fractures, with motorcycle accidents as the major cause. Therefore, road accident prevention is still indispensable to reduce possible accidents, such as through serious arrest of motorcycle drivers who do not wear helmets, driver alcohol detection, and speed limits. Involved public agencies should increase measures in Mueang Chanthaburi district, particularly in December, the month with a relatively high rate of traffic accidents, in order to help reduce the potential for accidents and help the country. This is because most patients are still in their teenage or working - age years, and they comprise the key force for national development in the future.

Conflicts of Interest: None

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