

## Treatment of oromaxillofacial fracture in elderly: A literature review

### Perawatan fraktur oromaksilofasial pada manula: Tinjauan Literatur

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#### ABSTRACT

Maxillofacial fracture in elderly patients mostly related to age-related changes and systemic pathologic conditions. However, traumatic injuries in the elderly have been increasing in recent years; this is due to increased active life span with advances in medicine that result in a higher percentage of older people in the population. This article is a review of oromaxillofacial fracture in elderly that published since the last 10 years obtained through the search of the electronic database PubMed and Google Scholar, then selected as many as six studies based on the treatment of oromaxillofacial fracture in elderly. Based on the selected literature that has been reviewed, falls were responsible for the majority of fractures in the elderly group. The fracture locations are varied but most common site is zygomatic complex, nasal bone, and condylar. The results of this literature review highlight that majority of elderly patients are treated without surgical procedures. It is concluded that the treatment of maxillofacial trauma in elderly patients is often challenging, as elderly patients require specific attention and multidisciplinary collaboration in the diagnosis and sequencing of trauma treatment.

**Keywords:** geriatric facial trauma, management of maxillofacial trauma in elderly, oromaxillofacial fracture in elderly

#### ABSTRAK

Fraktur maksilofasial pada pasien usia lanjut sebagian besar terkait dengan perubahan terkait usia dan kondisi patologi sistemik. Namun, cedera akibat traumata pada manula telah meningkat dalam beberapa tahun terakhir akibat peningkatan rentang hidup aktif dengan kemajuan dalam kedokteran yang menghasilkan peningkatan jumlah manula dalam populasi. Artikel ini merupakan review terhadap literatur fraktur oromaksilofasial pada manula, yang dipublikasi dalam 10 tahun terakhir, yang diperoleh melalui penelusuran database elektronik PubMed dan Google Scholar. Diperoleh enam artikel berdasarkan pengobatan fraktur oromaksilofasial pada manula. Hasilnya, jatuh bertanggung jawab atas sebagian besar fraktur pada kelompok usia lanjut. Lokasi fraktur bervariasi tetapi situs yang paling umum adalah kompleks zygomatic, tulang hidung atau condylar. Sebagian besar perawatan pasien usia lanjut tanpa prosedur operasi. Disimpulkan bahwa penatalaksanaan trauma maksilofasial pada pasien usia lanjut seringkali menantang, karena memerlukan perhatian khusus dan kolaborasi multidisiplin dalam diagnosis dan urutan perawatan trauma.

**Kata kunci:** trauma wajah geriatri, penatalaksanaan trauma maksilofasial pada manula, fraktur oromaksilofasial pada manula

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#### INTRODUCTION

Maxillofacial fracture in elderly patients mostly related to age-related changes and systemic pathologic conditions. However, traumatic injuries in the elderly have been increasing in recent years; this is due to increased active life span with advances in medicine that result in a higher percentage of older people in the population.<sup>1</sup>

Trauma has a greater physical impact on elderly people because of their decreased physical reserves and age-related coexisting conditions including osteoporosis, reduced muscle mass, and cognitive decline. Furthermore, since the number of lost teeth is greater among the elderly than in young people, management is complicated by difficult recovery of occlusal function and basic diseases. Therefore, it is important to understand the characteristics and actual condition of maxillofacial fractures of the elderly in developing a treatment plan.<sup>2</sup>

The management of geriatric patients with facial fractures is often challenging, as they are more severely injured, hospital stay is prolonged, and deaths following

trauma occur more frequently compared with younger adults. The perioperative management of the acutely injured elderly patient is also more complex than that of younger patients, with a disproportionate consumption of health care resources.<sup>3</sup>

The principles treatment of facial fractures in the elderly population and adults remain basically the same. However, the way they are really managed in the geriatric population may become noticeably different due to anatomical and physiological alterations in this population. Bone atrophy, inadequate blood supply, reduced capacity for tissue repair, declining baseline functions, and above all the prevalence of pre-existing diseases and comorbidities may change not only timing of surgery but also the indications for surgery in elderly patients.<sup>3</sup> So, in this study it is reviewed about oromaxillofacial fracture in elderly.

#### METHODS

This study was a review to literatures of oromaxillo-

facial fracture in elderly that published since the last 10 years (2012-2022) using keywords ‘oromaxillofacial fracture in elderly’, ‘geriatric facial trauma’, and ‘management of maxillofacial trauma in elderly’ obtained through the search of the electronic database PubMed and Google Scholar. A total of 359 articles were found then selected as many as six studies on the based on the treatment of oromaxillofacial fracture in elderly.

The literature study of oromaxillofacial in elderly, is categorized by country, time of study, number of patients and total fractures, average of ages, gender, etiology, location of fracture, and treatment.

## RESULTS

Each study is presented in the Table 1. *Velayutham et al.*, conducted a prospective study over 2 years (2009-2010); all injured patients referred to Oral and Maxillofacial Surgery Unit at Canberra Hospital, Australia. A total of 40 patients were 60 or older. There were 26 women (65%) and 14 men (35%) whose ages ranged from 60 to 96 years, median 76 and mean (SD) 76 (11). Falls were the most common cause of fracture (85%) and the zygoma (38,3%) was the bone most common fractured. Seventeen percent of the facial injuries were operated. Most of the fractures were minimally displaced zygomatic fractures, which confirms a recent paper by Rehman and Edmondson who treated only a quarter of their mid-face fractures surgically. However, the decision to operate is based on more confounding factors than just severity alone, and include the preferences of the surgeon, the patient, and the anaesthetist. Older patients also tend to place less focus on aesthetics but more focus on function.<sup>4</sup>

Nogami et al., conducted a study of 201 patients aged 65 years and older, who were treated for maxillofacial fractures at the Department of Oral and Maxillofacial Surgery, Kyushu Dental University, and Tohoku University from January 2002 to December 2013. There were 94 males and 107 females. Ages ranged from 65 to more than 86 years, with the largest percentage aged 76-85 years ( $n=99$ , 49.3%). The average age of all was  $74.2 \pm 4.6$  (SD) years, while that for males was  $71.7 \pm 5.4$  years and for females was  $76.8 \pm 5.6$  years. A fall was responsible for the majority of the fractures (173/201), followed by traffic accident (22/201), while assault was also responsible for 6. The 201 patients had a total of 386 fractures of the mandible, with 57 seen in the angle, 125 in condyle, 151 in symphysis, and 53 in body. There was a total of 162 multiple fractures of the mandible, with 20 seen in the symphysis + angle, 105 in the symphysis + condyle, 26 in the symphysis + body, and 11 in the angle + condyle. As for the method of treatment, observation (5,6%), maxillomandibular fixation (38,4%), arthrocentesis (49,6%), open reduction-internal fixation (6,4%).<sup>5</sup>

Ogura et al., 2016, conducted a retrospective study of patients with maxillofacial fractures who underwent 64 multidetector-row CT (64-MDCT) within 7 days after injury at Nihon University School of Dentistry Hospital April 2006-May 2014. The study patients consisted of 81 elderly patients (45 men, 36 women; age 60-87 years, mean age 69.8 years). Regarding cause of injury, the proportions of falls, traffic accidents, assaults, and sports incidents were 48 cases, 26 cases, 6 cases, and 1 case respectively ( $p<0.001$ ). The percentages of cases with angle fracture, condylar fracture, and median fracture were 3.7% (3/81 cases), 63.0% (51/81 cases) and 16.0% (13/81 cases) respectively. Regarding midface fracture, Le Fort I-III (2,5%), isolated maxillary (1,2%), isolated zygomatic arch (6,2%) and zygomaticomaxillary complex (16,0%). There are no mentioned of treatment in this literature.<sup>6</sup>

Possebon et al., conducted research of accessed medical and dental records of all subjects with maxillofacial trauma who sought emergency care in Pelotas, Brazil, February 2003-February 2013. All records were analyzed ( $n=13,715$ ), but only records with complete data belonging to participants over age 60 years with maxillofacial trauma were considered for this study ( $n=677$ ). Registries comprised 272 individuals (40.18%) between the ages 60-69 years, 238 individuals (35.16%) 70-79 years, and 167 individuals (24.67%) age 80 or older. Female participants' records were more prevalent ( $n=390$ ), making up 57.61% of the sample. Descriptive analysis of the results showed that falls were the most common cause of maxillofacial trauma ( $n=463$ , 68.39%), followed by “other” ( $n=76$ , 11.23%), traffic accidents ( $n=73$ , 10.78%) and aggression ( $n=65$ , 9.6%). The most common diagnosis was laceration or blunt injury ( $n=396$ ), followed by contusion ( $n=127$ ), fractures ( $n=101$ ), and “other” ( $n=53$ ). The maxillofacial fractures that were most frequently observed were nose fractures ( $n=73$ ), followed by the zygomatic-maxillary complex ( $n=19$ ). Fractures of greater severity, as facial polytrauma, had less occurrence ( $n=3$ ). There is no mentioned of treatment in this literature.<sup>7</sup>

Brucoli et al., conducted a study that was conducted at several European departments of oral and maxillofacial surgery. The study was based on a systematic computer-assisted database that allowed the recording of data from all geriatric patients (70 years or more) with facial fractures from the involved maxillofacial surgical unit across Europe, January 1, 2013-December 31, 2017. A total of 1334 patients (45% male and 55% female) met the inclusion criteria and were included in the study. The mean age of the study population was 79.3 years (median, 78 years; standard deviation, 6.5 years; range 70-100 years). According to decades, most patients (754, 56.5%) could be included in the seventh decade of age

**Table 1** Maxillofacial fracture in elderly patients based in literatures

Author	Country (elderly patient & total fracture)	Average of Age (Year & %)	Gender (M:F)	Etiology	Fractures	Treatment
Velayutham, et al 2013 <sup>4</sup>	Australia (40 & 47)	Average 76 (60-96 years)	14:26	<ul style="list-style-type: none"> <li>• Fall (85%)</li> <li>• Motor vehicle accident (8%)</li> <li>• Assault (3%)</li> <li>• Sports (2%)</li> <li>• Others (2%)</li> </ul>	<ul style="list-style-type: none"> <li>• Orbital complex (14,9%)</li> <li>• Nasal bone (19,1%)</li> <li>• Zygomatic complex (38,3%)</li> <li>• Maxilla (8,5%)</li> <li>• Mandible (10,6%)</li> <li>• Dentoalveolar complex injury (4,3%)</li> <li>• Laceration (4,3%)</li> </ul>	<ul style="list-style-type: none"> <li>• Operation (17%)</li> <li>• No operation (83%)</li> </ul>
Nogami, et al 2014 <sup>5</sup>	Japan (201 & 386)	<ul style="list-style-type: none"> <li>• 65-75 (41,8%)</li> <li>• 76-85 (49,3%)</li> <li>• &gt;86 (8,9%)</li> </ul>	94:107	<ul style="list-style-type: none"> <li>• Fall (86%)</li> <li>• Traffic accident (11%)</li> <li>• Assault (3%)</li> </ul>	Site of mandibular fractures: <ul style="list-style-type: none"> <li>• Angle (14,8%)</li> <li>• Condyle (32,4%)</li> <li>• Symphysis (39,1%)</li> <li>• Body (13,7%)</li> </ul> Multiple mandibular fractures: <ul style="list-style-type: none"> <li>• Symphysis + angle (12,3%)</li> <li>• Symphysis + condyle (64,8%)</li> <li>• Symphysis + body (16,0%)</li> <li>• Angle + condyle (6,9%)</li> </ul>	<ul style="list-style-type: none"> <li>• Observation (5,6%)</li> <li>• Maxillomandibular fixation (38,4%)</li> <li>• Arthrocentesis (49,6%)</li> <li>• Open reduction and internal fixation (6,4%)</li> </ul>
Ogura, et al 2016 <sup>6</sup>	Japan (81 & 100)	Average 69,8 (60-87 years)	• 45:36	<ul style="list-style-type: none"> <li>• Fall (59,3%)</li> <li>• Traffic accident (32,1%)</li> <li>• Assault (7,4%)</li> <li>• Sports (1,2%)</li> </ul>	Mandible <ul style="list-style-type: none"> <li>• Median (16,0%)</li> <li>• Paramedian (14,8%)</li> <li>• Angle (3,7%)</li> <li>• Condylar (63,0%)</li> </ul> Midface <ul style="list-style-type: none"> <li>• Le Fort I-III (2,5%)</li> <li>• Isolated maxillary (1,2%)</li> <li>• Isolated zygomatic arch (6,2%)</li> <li>• Zygomaticomaxillary complex (16,0%)</li> </ul>	<ul style="list-style-type: none"> <li>• No mentioned about treatment</li> </ul>
Possebon, et al 2017 <sup>7</sup>	Brazil (677 & 101)	<ul style="list-style-type: none"> <li>• 60-69 (40,18%)</li> <li>• 70-79 (35,16%)</li> <li>• &gt;80 (24,67%)</li> </ul>	287:390	<ul style="list-style-type: none"> <li>• Fall (68,39%)</li> <li>• Other (11,23%)</li> <li>• Traffic accidents (10,78%)</li> <li>• Aggression (9,6%)</li> </ul>	<ul style="list-style-type: none"> <li>• Orbit (0,99%)</li> <li>• Zygomatic-maxillary complex (18,81%)</li> <li>• Nose (72,27%)</li> <li>• Mandible (3,96%)</li> <li>• Maxilla (0,99%)</li> <li>• Facial polytrauma (2,98%)</li> </ul>	<ul style="list-style-type: none"> <li>• No mentioned about treatment</li> </ul>
Brucoli, et al 2019 <sup>3</sup>	European (1.334 & 1.717)	<ul style="list-style-type: none"> <li>• 70-79 (56,5%)</li> <li>• 80-89 (35,8%)</li> <li>• 90-99 (7,5%)</li> <li>• 100 (0,2%)</li> </ul>	599:735	<ul style="list-style-type: none"> <li>• Fall (79%)</li> <li>• Motor Vehicle Accident (8%)</li> <li>• Assault (4%)</li> <li>• Work (2%)</li> <li>• Sports (2%)</li> <li>• Others (5%)</li> </ul>	<ul style="list-style-type: none"> <li>• Orbital-Zygomatic-Maxillary Complex (30,0%)</li> <li>• Mandible (24,1%), Orbit (21,7%)</li> <li>• Le Fort (10,1%)</li> <li>• Nose (9,6%)</li> <li>• Frontal Sinus (1,7%)</li> <li>• Dentoalveolar Maxilla (1,1%)</li> <li>• Naso-orbital-ethmoid (0,8%)</li> <li>• Dentoalveolar Mandible (0,5%)</li> <li>• Palatal bone (0,2%)</li> </ul>	<ul style="list-style-type: none"> <li>• No mentioned about treatment</li> </ul>
Liu, et al 2019 <sup>8</sup>	New Jersey (139 & 205)	Average 75,7 (60-103 years)	69:70	<ul style="list-style-type: none"> <li>• Fall (100%)</li> </ul>	<ul style="list-style-type: none"> <li>• Orbit (42,4%), Nasal bone (23,3%)</li> <li>• Zygoma (13,2%)</li> <li>• Zygomaticomaxillary complex (7,3%)</li> <li>• Mandible (4,9%), Frontal sinus (5,9%)</li> <li>• Le Fort (2,0%)</li> <li>• Naso-orbital-ethmoid (0,5%)</li> <li>• Palate (0,5%)</li> </ul>	<ul style="list-style-type: none"> <li>• Operative fixation (21.5%)</li> <li>• No operative fixation (78.5%)</li> </ul>

478 patients (35.8%) in the eighth decade of age, 100 patients (7.5%) in the ninth decade of age and 2 patients (0.2%) in the tenth decade of age. As for etiology, the most frequent cause of injury was fall with 1054 patients (79%), followed by motor-vehicle accidents (8%), assaults (4%), work (2%), sports (2%) and others (5%). As for fractures, orbital-zygomatic-maxillary fractures were the most frequently observed injuries (515 fractures), followed by mandibular fractures (414), orbital fractures (373), Le Fort fractures (174), nasal fractures (165), frontal sinus fractures (30), dentoalveolar maxilla fractures (19), naso-orbital-ethmoid fractures (14), dentoalveolar mandible (9) and palatal bone fracture (4). There are no mentioned of treatment in this literature.<sup>3</sup>

Liu et al, conducted a retrospective review of all facial fractures in a level 1 trauma center in an urban environment (University Hospital, Newark, NJ) was performed for the years 2002-2012 based on International Classification of Disease, revision 9 (ICD-9) codes. During the time period examined, 319 patients identified as greater than 60 years of age were admitted to the emergency department due to facial fractures. Of the 319 patients, 139 had sustained a fracture of the facial skeleton as the result of a fall. Of the 3,147 facial fractures treated at our institution from 2000-2012, 205 fractures were due to elderly falls. The average age of the patients was 75.7 years, with no gender predominance of statistical significance as there were 50.4% female and 49.6% male, or a male: female ratio of 1.02. There was a total of 205 fractures recorded in 139 patients. The most common fracture sites were those of the orbit (n=87), nasal bone (n=48), zygoma (n=27), zygomaticomaxillary complex (n=5), mandible (n=10), frontal sinus (n=12), Le Fort (n=4), naso-orbital-ethmoid (n=1) and palate (n=1). Twenty-one patients were intubated on, or prior to, arrival to the trauma bay, and 44 required a surgical airway. Distribution of facial fractures in patients who required surgical airway were those of the orbit (n=27), nasal bone (n=10), zygoma (n=11), zygomaticomaxillary complex (n=6), mandible (n=7), frontal sinus (n=2), Le Fort (n=3), naso-orbital-ethmoid (n=1) and palate (n=0). Twenty-two patients required operative fixation of their facial fractures and underwent open reduction and internal fixation with titanium plates and screws. An additional four patients required surgical repair of facial soft tissue injuries. Two patients with mandible fractures were treated with closed reduction and maxillomandibular fixation. The remainder of the patients underwent closed reduction and soft tissue management.<sup>8</sup>

## DISCUSSION

One of the most demanding, yet rewarding, aspects of dental and surgical practice is the management of the

patient who has sustained oral or facial trauma. The abruptness of the injury can cause intense emotional distress, even when only minor injuries are present. The perception of the injury by the patient or family and their reaction to the trauma may seem out of proportion to the degree of injury. The patient and family may be anxious and fearful, and they depend heavily on the clinician to make an accurate diagnosis, communicate it to them, offer hope for a successful outcome, and perform the treatment necessary to repair the injury and restore function and esthetics. Therefore, clinician must effectively deal with the patient's physical injury as well as the emotional state. Few conditions in clinical practice demand such compassion, competence, and attention to detail.<sup>9</sup>

In this literature study, the maxillofacial trauma focusses on elderly patients and categorized by country, time of study, number of patients and total fractures, average of ages, gender, etiology, location of fracture, and treatment. There are five country locations in this literature namely Australia, Japan, Brazil, Across Europe and New Jersey. Total of elderly patients as low as 40 and as high as 1.334 with total fracture of 47 to 1.717.<sup>3-8</sup>

All six literatures confirm that falls were responsible for the majority of fractures in the elderly group with Velayutham et al, 85%; Nogami et al, 86%; Ogura et al, 59.3%, Possebon et al, 68.39%; Brucoli et al, 79% and Liu et al, 100% because they focused their study in facial fractures as a result of falls in the elderly. All of these findings inform that there is a need for support for the elderly, especially in public areas to avoid falling so as to reduce the risk of maxillofacial trauma.<sup>3-8</sup>

The fracture locations are varied but most common site is zygomatic complex (>18%), nasal bone (>19%) or condylar (>32%). Furthermore, most common fracture location of each literature is Velayutham et al., zygomatic complex 38.3%, Nogami et al, symphysis 39.1%, Ogura et al, condylar 63%, Possebon et al, nose 72.27%; Brucoli et al., orbital-zygomatic-maxillary complex 30.0% and Liu et al, nasal bone 23.3%.<sup>3-8</sup> The results of this literature study highlight that most of the treatment for elderly patients (>60%) are no operation procedure.

The treatment of maxillofacial trauma in elderly patients is often challenging, as elderly patients require specific attention and multidisciplinary collaboration in the diagnosis and sequencing of trauma treatment. However, the decision to operate is based on more confounding factors than just severity alone, and include the preferences of the surgeon, the patient, and the anaesthetist. Older patients also tend to place less focus on aesthetics and more focus on function than younger people.

## Conflict of Interest

The author declares no conflict of interests

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