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## Research Article

# Mandibular Angle Fractures Fixation by Champy Technique Comparing Lateral Plate Fixation

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## Abstract

**Background and Aims:** A break through the mandibular bone is referred to as a mandibular fracture or jaw fracture. The split happens in two locations in roughly 60% of cases. It could lead to a reduced capacity for mouth opening. The teeth will frequently feel out of alignment, and the gums may bleed. This study aimed to compare the effects of two treatment approaches for mandibular angle fractures including the Champy plate against lateral plate techniques.

**Materials & Methods:** Between January 1, 2023 and the end of December 2023, patients with mandibular angle fractures were found in two equal groups at the Military Hospital in Sana'a, Yemen, where the research was conducted by the Department of Oral and Maxillofacial Surgery. Twenty patients in group A received treatment with Champy plate, and another twenty patients in group B received treatment with lateral plate technique. The patients were treated and followed up at the second and eighth weeks and after six months; after surgery, the incidence of both groups of postoperative infection, malocclusion, nonunion or malunion of fracture fragments, scars, numbness of the lips, wound dehiscence and swelling were assessed by radiological and clinical evaluation.

**Results:** The study reveals that the majority of patients with mandibular angle fractures in Sana'a, Yemen, are aged 20-29, with road transport accidents being the most common cause. Most fractures are unilateral or displaced, with 65% involving maxillomandibular fixation and 52% using an oral approach. Despite some complications, wound dehiscence and infection rates were not reported at six months. During the two - week follow-up period, 90% of patients using the Champy plate experienced swelling, malocclusion, and lip paraesthesia, compared to 100% using lateral plate techniques, and no cases occurred in the lateral plate group. The study found that 5% of patients using the Champy plate developed non-union during the eight- week follow-up period, while 95% of patients in the lateral plate group had a scar at six months' follow-up.

**Conclusion:** The study found that males are 100% more likely to have mandibular fractures, with the majority occurring in those aged 20-29 (67.5%). Road traffic accidents and bomb blasts were the most common causes. The Champy plate was found to be the most reliable and efficient management method for treating mandibular angle fractures.

**Keywords:** Champy plate technique, Lateral plate technique, Mandibular angle fractures, Yemen.

## Introduction

A break through the mandibular bone is referred to as a mandibular fracture or jaw fracture. The split happens in two locations in roughly 60% of cases. It could lead to a reduced capacity for mouth opening.

The teeth will frequently feel out of alignment, and the gums may bleed. Males in their 30s are most likely to sustain a mandibular fracture [1]. Trauma is usually the cause of mandibular fractures. This may involve a side strike or a fall onto the chin. On rare occasions, they could result from bone malignancies or osteonecrosis. The condyle (36%), body (21%), angle (20%), and symphysis (14%), are the most often fractured areas. Rarely, the ramus (3%) or coronoid process (2%), both of which are susceptible to fracture. Modern CT scans are more accurate than basic X-rays, albeit they can sometimes be used to make a diagnosis [1]. Surgery is not always necessary right away. On rare occasions, patients may return home and undergo surgery within the next several days. Open reduction internal fixation (ORIF) and maxillomandibular fixation are two surgical procedures that may be employed [1,2]. Antibiotics like penicillin are frequently prescribed to people for a short time. However, there is little evidence to support this approach [1-4]

According to Allareddy and Nalliah [5], mandibular angle fractures have the highest number of complications and are the second most common reason for hospital emergency admission for facial fractures. The final course of treatment is internal fixation. There are numerous internal fixation techniques available, however one of the more well accepted techniques for internal fixation of mandibular angle fractures is Champy's approach. In their initial publication, Champy and Michelet applied force to the model's mandibular anterior teeth and established the fundamental ideas that underpin almost all treatment approaches. Even under ideal circumstances, a trauma patient who has had internal fixation would never utilize force on their anterior teeth for a few weeks, but even patients are advised not to use them. According to many writers, posterior loading will alter the biomechanics entirely [6]. Infection and other complications, particularly in the areas of psychological issues and long-term intermaxillary fixation, will result from an internal fixation device malfunction [7]. because a primary source of function is posterior loading. It would make more sense to evaluate posterior burden. Numerous authors use the finite element technique (FEM) to model the stress distribution of implanted devices in the mandible under functional load [8]. In order to compare with anterior loading and talk about potential changes that small adjustments could make to our understanding of the biomechanics of mandibular angle fracture, we use a finite element model to evaluate the stress distribution on a fractured mandible while loading the mandible clenching, which is a more likely function in a post-operative trauma patient.

Since no prior study has been conducted in Yemen to assess the Champy Technique's ability to cure mandibular angle fractures, there is still need for development even though the results of mandibular fracture therapy are generally satisfactory elsewhere. This study's main goal was to assess how well Yemeni patients responded to the Champy Technique for fixing mandibular angle fractures.

## Material And Methods

A comparative, serial clinical follow-up study was carried out. Patients presenting with trauma at military hospital in maxillofacial surgery department between the first of January 2023 and the end of December 2023 were included in this study. Detailed information consisting of age, sex, socioeconomic status, chief complaint, history of present illness, past medical history, duration of injury, etiology, and associated injuries was recorded. After recording the data, a thorough clinical examination as well as radiological interpretation was done for each patient in this study for establishing the diagnosis. The patients divided into groups, group 1 (20 patients) treated by using the Champy plate and group 2 (20 patients) treated with lateral plate techniques then they follow-up at two weeks, eight weeks and six months for evaluation the treatment of mandibular angle fracture; and recorded complications and outcomes. The data was analyzed in relation to age, sex, aetiology of the fracture, site of fracture line, unilateral or bilateral, isolated fractures versus mandibular fractures with associated injuries, and commonest combination of fracture site in mandible. The statistical analysis was done using Epi-Info (CDC) Version 6 Statistical Analysis Software. The values were represented in frequencies and percentages. Also associated odds ratio was calculated for each methods with respect to complications, and significance was done by calculation chi-square and p values. Level of significance:  $P > 0.05$  is not significant,  $P < 0.05$  is significant,  $P < 0.01$  is highly significant, and  $P < 0.001$  is very highly significant.

## Results

Table 3.1 shows the age and sex distribution of patients with mandibular angle fracture attending Military hospital in Sana'a city, Yemen. The male patients counts 100% and female patients was 0.0%. The mean age of our patients was 24.1 years and ages ranged from 19 years - 42 years. Most of our mandibular angle fracture patients were in the age group of 20 - 29 years (67.5%). The most common cause of mandibular angle fractures was road transport accidents (R.T. A.) accounting for 60% of the total, followed by bomb explosions (BE) accounting for 22.5% of the total and gunshot injuries (G. S. I.) accounting for 15%, while other causes accounted for

only 2.5% of the total patients. The most fracture types were Associated Angle counting 65% Vs isolated angle counting only 35%. Most patients were suffered from unilateral angle fractures counting 92.5% while bilateral angle only counted 7.5%. Most patients were suffered from displaced angle counting 85% while non-displaced angle only counted 15%. Favorable angle was not recorded in our patients (0.0%) and all patients had unfavorable angle (100%). Lower 3rd Presence were counting in 92.5% of our patients while non-lower 3rd presence counted in 7.5% of our patients. All patients under taking radiographic evidences by CT. Scan and panorama. Considering the gaps between fracture segments, 45% of the patients suffering from 5-7 mm gaps, followed by 32.5% with more than 7 mm gap and 22.5% with less than 5 mm gap between the fracture segments. Considering treatment type for the mandibular angle fracture patients, 65% of the patients were treated with maxillomandibular fixation (M.M.F.), and 35% were treated by No- maxillomandibular fixation (No M.M.F.). Considering the approach of fixation 52.5% of the patients had oral approach, while 47.5% had extra-oral approach. Considering infection as a complication that occurs after surgery, 30% of patients using the Champy plate developed an infection during the two-week follow-up compared to 55% of patients using the side plate techniques during the two-week follow-up, while at eight-week and six-month follow-up only 5% of patients in both groups developed an infection. As wound dehiscence is a complication that occurs after surgery, 15% of patients using the Champy plate developed wound dehiscence during the two-week follow-up period compared to 10% of patients using the lateral plate techniques during the two-week follow-up period, while at the six-month follow-up period, patients in both groups did not have wound dehiscence. As swelling is a complication that occurs after surgery, 90% of patients using the Champy plate developed swelling during the two-week follow-up period compared to 100% of patients using the lateral plate techniques during the two-week follow-up period, while at the eight-week follow-up period, 10% of patients using the Champy plate developed swelling, and no patients developed swelling in the lateral plate group in the eight-week follow-up period. As malocclusion is a complication that occurs after surgery, 5% of patients using the Champy plate developed malocclusion during the two-week follow-up period compared to 15% of patients using the lateral plate techniques during the two-week follow-up period, while at the eight-week and six-month follow-up period, 10% of patients using the Champy plate developed malocclusion, and no patients developed malocclusion in both groups in the eight-week and six-month follow-up period. As lip paraesthesia is a complication that occurs after surgery, 100% of patients using the Champy plate developed lip paraesthesia during the two-week follow-up period compared to 75% of patients using the lateral plate techniques during the two-week follow-up period, while at the eight-week follow-up

period, 15% of patients using the Champy plate developed lip paraesthesia, and no patients developed lip paraesthesia in the lateral plate group in the eight weeks, while in the six-month follow-up period no case of lip paraesthesia occurred in both groups. As Non-Union is a complication that occurs after surgery, 5% of patients using the Champy plate developed Non-Union during the eight-week follow-up period compared to 5% of patients using the lateral plate techniques during the eight-week follow-up period, while at the six-month follow-up period, 5% of patients using the Champy plate developed Non-Union and no patients developed Non-Union in the lateral plate group in the six-month follow-up period. As scar is a complication that occurs after surgery, 5% of patients using the Champy plate developed a scar during the eight-week follow-up period compared to 95% of patients using the lateral plate techniques during the eight-week follow-up period. Also, at the six-month follow-up period, 5% of patients using the Champy plate still had a scar and 95% of the patients in the lateral plate group had a scar. Table 3.6 shows the postoperative complications associated with the Champy plate and lateral plate techniques. There was a highly significant association between scar development and lateral plate technique in which the odds ratio was 126 times, with a 95% CI equal to 11.6 to 466 and a chi-square equal to 126 and a p value <0.0001. On the other hand, there was association between infection and lateral plate (OR = 1.7), wound dehiscence and Champy plate (OR = 2.6), swelling and lateral plate (OR = 1.2), malocclusion and lateral plate (OR = 3.1), lip paraesthesia and Champy plate (OR = 1.3), and non-union with Champy plate (OR = 2.1), but all these associations were not statistically significant.

| Characters                | N (%)               |
|---------------------------|---------------------|
| Sex                       |                     |
| Male                      | 40 (100)            |
| Female                    | 0 (0.0)             |
| <b>Age groups (years)</b> |                     |
| Less than 20 years        | 6 (15)              |
| 20 -29 years              | 27 (67.5)           |
| ≥30 years                 | 7 (17.5)            |
| Total                     | 40 (100)            |
| Mean age                  | 24.1 years          |
| Min - Max                 | 19 years - 42 years |

**Table 1:** Age and gender distribution of patients with mandibular angle fracture Sana'a city, Yemen.

| Etiology                            | N (%)    |
|-------------------------------------|----------|
| Road transport accidents (R. T. A.) | 24 (60)  |
| Bomb explosions (B. E.)             | 9 (22.5) |

|                             |          |
|-----------------------------|----------|
| Gunshot injuries (G. S. I.) | 6 (15)   |
| Others                      | 1 (2.5)  |
| Total                       | 40 (100) |

**Table 2:** Etiology of mandibular angle fracture among patients attending the Military Hospital, Sana'a City, Yemen.

| Fracture types        | N (%)     |
|-----------------------|-----------|
| Isolated Angle        | 14 (35)   |
| Associated Angle      | 26 (65)   |
| Unilateral Angle      | 37 (92.5) |
| Bilateral Angle       | 3 (7.5)   |
| Displaced Angle       | 34 (85)   |
| Non-displaced Angle   | 6 (15)    |
| Favorable Angle       | 0 (0.0)   |
| Unfavorable Angle     | 40 (100)  |
| Lower 3rd Presence    | 37 (92.5) |
| No Lower 3rd Presence | 3 (7.5)   |
| Total                 | 40 (100)  |

**Table 3:** The mandibular angle fracture types among patients attending Military hospital, Sana'a city, Yemen.

| Characters                                | N (%)     |
|---|-----------|
| <b>The gaps between fracture segments</b> |           |
| Less than 5 mm                            | 9 (22.5)  |
| 5 – 7 mm                                  | 18 (45)   |
| More than 7 mm                            | 13 (32.5) |
| <b>Treatment type</b>                     |           |
| Maxillomandibular fixation (M.M.F.)       | 26 (65)   |
| No-maxillomandibular fixation (No-M.M.F.) | 14 (35)   |
| <b>The Approach for Fixation</b>          |           |

|                     |           |
|---------------------|-----------|
| Oral Approach       | 21(52.5)  |
| Extra-Oral Approach | 19 (47.5) |
| Total               | 40 (100)  |

**Table 4:** The gap between fracture segments, treatment types and the Approach for fixation for the mandibular angle fracture among patients attending Military hospital, Sana'a city, Yemen.

| Complications           | Follow-up times |         |          |
|-------------------------|-----------------|---------|----------|
|                         | 2 weeks         | 8 weeks | 6 months |
| <b>Infections</b>       |                 |         |          |
| Champy plate n=20       | 6 (30)          | 1(5)    | 1 (5)    |
| Lateral plate n=20      | 11 (55)         | 1 (5)   | 1 (5)    |
| <b>Wound Dehiscence</b> |                 |         |          |
| Champy plate n=20       | 3 (15)          | 1 (5)   | 0 (0.0)  |
| Lateral plate n=20      | 2 (10)          | 0 (0.0) | 0 (0.0)  |
| <b>Swelling</b>         |                 |         |          |
| Champy plate n=20       | 18 (90)         | 2 (10)  | 0 (0.0)  |
| Lateral plate n=20      | 20 (100)        | 0 (0.0) | 0 (0.0)  |
| <b>Malocclusion</b>     |                 |         |          |
| Champy plate n=20       | 1 (5)           | 0 (0.0) | 0 (0.0)  |
| Lateral plate n=20      | 3 (15)          | 0 (0.0) | 0 (0.0)  |
| <b>Lip Paraesthesia</b> |                 |         |          |
| Champy plate n=20       | 20 (100)        | 3 (15)  | 0 (0.0)  |
| Lateral plate n=20      | 17 (75)         | 0 (0.0) | 0 (0.0)  |
| <b>Non-Union</b>        |                 |         |          |
| Champy plate n=20       | -               | 1 (5)   | 1 (5)    |
| Lateral plate n=20      | -               | 1 (5)   | 0 (0.0)  |
| <b>Scar</b>             |                 |         |          |
| Champy plate n=20       | -               | 1 (5)   | 1 (5)    |
| Lateral plate n=20      | -               | 19 (95) | 19 (95)  |

**Table 5:** Post-operative complications using the Champy plate and lateral plate techniques with follow -up at two weeks, eight weeks and six months for the treatment of mandibular angle fracture.

| Associated factors      | Positive  | OR  | 95%CI    | X2   | p    |
|-------------------------|-----------|-----|----------|------|------|
| <b>Infections</b>       |           |     |          |      |      |
| Champy plate n=60       | 8 (13.3)  | 0.5 | 0.2-1.4  | 1.4  | 0.2  |
| Lateral plate n=60      | 13 (21.6) | 1.7 | 0.6-4.7  | 1.4  | 0.2  |
| <b>Wound Dehiscence</b> |           |     |          |      |      |
| Champy plate n=20       | 5 (25)    | 2.6 | 0.4-14   | 1.3  | 0.24 |
| Lateral plate n=20      | 2 (10)    | 0.3 | 0.07-2   | 1.3  | 0.24 |
| <b>Swelling</b>         |           |     |          |      |      |
| Champy plate n=60       | 18 (30)   | 0.8 | 0.3- 1.8 | 0.15 | 0.63 |

|                     |           |       |             |      |         |
|---------------------|-----------|-------|-------------|------|---------|
| Lateral plate n=60  | 20 (33.3) | 1.2   | 0.5-2.5     | 0.15 | 0.69    |
| <b>Malocclusion</b> |           |       |             |      |         |
| Champy plate n=60   | 1 (1.7)   | 0.3   | 0.02-3.1    | 1.03 | 0.3     |
| Lateral plate n=60  | 3 (5)     | 3.1   | 0.3-30.7    | 1.03 | 0.3     |
| Lip Paraesthesia    |           |       |             |      |         |
| Champy plate n=60   | 20 (33.3) | 1.3   | 0.6-2.7     | 0.35 | 0.55    |
| Lateral plate n= 60 | 17 (28.3) | 0.79  | 0.3-1.7     | 0.35 | 0.55    |
| <b>Non-Union</b>    |           |       |             |      |         |
| Champy plate n=40   | 2 (5)     | 2.1   | 0.17 -23    | 0.34 | 0.55    |
| Lateral plate n=40  | 1 (2.5)   | 0.48  | 0.04-5.6    | 0.34 | 0.55    |
| <b>Scar</b>         |           |       |             |      |         |
| Champy plate n=20   | 2 (10)    | 0.006 | 0.0005-0.07 | 28.9 | <0.0001 |
| Lateral plate n=20  | 19 (95)   | 126   | 11.6-466    | 126  | <0.0001 |

**Table 6:** Postoperative complications associated with the Champy plate and lateral plate techniques.

## Discussion

"Breach in the continuity of bone" is the definition of a fracture [9]. 23–97% of all facial fractures occur in the face, making it one of the most often damaged body parts [10]. Since the mandible is the sole bone in the facial skeleton that can move, the number of cases has significantly increased in recent years. Compared to the other face bones, it is more likely to fracture and is a membrane bone in embryology. The frequency of mandibular fractures is double that of midfacial fractures [11]. It requires roughly 44.6–74.4 kg/m of energy to fracture, which is roughly equal to that of the zygoma and half that of the frontal bone [12-15]. It is four times as much force is required to fracture maxilla [16-21].

In the study, there were 100% more male patients than female patients (0.0%). Furthermore, the mean age of our patients was 24.1 years, with a range of 19 to 42 years. Sixty-five percent of our patients with mandibular angle fractures were in the 20–29 age range. In contrast to Shapiro et al. [22], who reported a mean age range of 34.1 years, and Ogundare et al. [23], this is consistent with Adi et al. [17], Bataineh [18], Dongas and Hall [19], Ahmed et al. [20], and Brasileiro and Passeri [21]. Additionally, our results align with earlier research conducted by Ellis et al. [24], Newlands et al. [25], Hussain et al. [26], Hollier et al. [27], and Muddassar et al. [28]. Males in their second and third decades made up the majority of study participants. Furthermore, all of the patients in the current study who had a mandibular angle fracture were MSNs. This is corroborated by previous studies conducted by Hussain et al. [26], Ellis et al. [24], Newlands et al. [25], Sharaf Aldin et al. [29] and Finn et al. [30]. This result can be explained by the fact that, as a result of Yemen's political stability and ongoing conflict, there is a nationwide tendency toward an increase in the number of men suffering

injuries, with men making up the majority of war victims that visit our facility at the Military hospital. Additionally, a higher proportion of casualties in war situations are frequently men since men are more prone to engage in combat-related activities [31].

Facial trauma has become a social disease that affects everyone due to the fast-paced nature of modern life, high-speed travel, and a society that is becoming more aggressive and intolerable. Changes in facial injury patterns, severity, clinical characteristics, and other factors lead to mild to severe maxillofacial skeletal deformity and functional loss [32]. Road transport accidents (R.T. A.) accounted for 60% of the total mandibular angle fractures in the current study, followed by bomb explosions (BE) at 22.5% and gunshot injuries (G. S. I.) at 15%. Other causes accounted for only 2.5% of the total patients. Road traffic accidents account for 60% of the study's etiologic factors, which is consistent with findings from Luce et al. [15], Bataineh [18], Shah et al. [33], Ahmed et al. [20], and Brasileiro and Passeri [21]. While our study does not disclose any such cases, Adi et al. [17], Dongas and Hall [19], and Olasoji et al. [34] identified assault as the primary cause. In contrast to Natu et al.'s research [32], where fall was the second etiologic factor responsible for 30.3% of the cases, this study does not record fall from height as an etiologic factor. According to all reports, the main cause of traffic accidents is still careless, fast driving, a refusal to use seat belts or helmets, and a lack of enforcement of traffic safety laws, especially in Yemen.

Unilateral angle fractures accounted for 92.5% of the patients in the current study, whereas bilateral angle fractures accounted for only 7.5%. This is greater than what Natu et al. reported [32]. Of the 66 participants, 37 (56.1%) had uni-

lateral symptoms, whereas 29 (43.94%) had bilateral symptoms. Additionally, our findings are consistent with those of Sakr et al. [35], who showed that 91% of cases had unilateral angle fractures and 9% had bilateral injuries.

According to the current study, which takes infection as a post-operative complication, only 5% of patients in both groups experienced an infection at the eight-week and six-month follow-up, while 30% of patients using the Champy plate and 55% of patients using the side plate techniques experienced an infection during the two-week follow-up. Additionally, patients who used the Champy technique experienced fewer additional issues than those who used the lateral plate technique. Nevertheless, the Champy procedure is not appropriate for all angle fractures and has practical limits. Following patients in the outpatient context is essential to ensuring secondary bone healing, as the use of monocortical plates prevents primary bone repair. In the context of substance misuse, homelessness, and other socioeconomic obstacles, this could be difficult or impossible. Using a transoral technique to reduce a misplaced or unfavorable fracture can be difficult. Using reduction forceps with an external technique improves the visualization and reduction of these fractures. Likewise, a transcervical technique should be used to properly expose and fixate a comminuted fracture with a reconstruction plate [32]. The specifics of the Champy approach are now being debated, particularly whether using one or two miniplates along the superior mandibular border is better. The use of a single 2-mm monocortical plate was linked to a low rate of complications (16%) in 1996, according to Ellis and Walker [36]. The most common problem was a local infection, which was treated with an outpatient incision and drainage, followed by the miniplate's removal under local anesthesia. However, these authors found that using paired miniplates resulted in a significantly greater complication risk of 29% [37]. According to Ellis, utilizing a single miniplate prevents needless dissection and maintains the blood supply to the fracture site. Other research, however, suggests that using two miniplates improves stability and reduces the likelihood of complications. In 68 patients treated with paired 2-mm miniplates, Fox and Kellman reported a low complication rate of 18% [38]. In a similar vein, Levy and colleagues discovered that fractures treated with paired miniplates had a very low complication rate of 3%, as opposed to 26% for fractures corrected with a single miniplate. The Champy notion states that the superior border along the external oblique line is the optimal osteosynthesis line for mandibular angle fractures (MAF). Therefore, they suggested using an intraoral method to treat MAF by placing one upper edge plate over this oblique line [39]. Champy's idea is still the finest method for fixing MAF and is now utilized to treat maxillofacial fractures. Using a single plate, avoiding the need for a cutaneous approach, and having a lower rate of complications are some of its benefits [40].

An in vitro investigation assessed the insertion of a second plate positioned on the lateral mandibular border following the development of the fixing techniques suggested by Champy. The study's findings demonstrated that, in comparison to a single plate positioned on the superior border, a second plate improved attachment stability [41]. Numerous clinical studies that sought to evaluate these two fixation techniques were subsequently published [42–45].

As previously mentioned, Champy's idea is the most studied MAF attachment technique and continues to be the best option [46]. However, as demonstrated in our study and in earlier research, problems such as infection [47], the need for plate removal [48], and postoperative malocclusion [49] can arise after any type of MAF fixation treatment, including Champy's and lateral plate. In this regard, selecting the appropriate course of treatment requires understanding which MAF fixation technique has the lowest incidence rate of problems. Furthermore, a few published systematic reviews compare the MAF fixing techniques in order to assess the complication rates. One plate had the lowest incidence of postoperative complications when compared to two plates, according to the results [50]. A more thorough examination of available treatments is now possible because to a more potent approach known as network meta-analysis (NMA), which enables researchers to incorporate more than two treatment categories in the statistics [51]. Therefore, an NMA was conducted to rank the best therapy and compare it to the most popular fixation method for MAF, which involves placing one plate over the superior border. The analysis's hypothesis was that there would be no difference in postoperative infection, the need for plate removal, postoperative malocclusion, and postoperative paraesthesia between a single plate positioned on the superior mandibular boundary and alternative MAF fixing techniques.

Considering infection as a post-operative complication, in the current study, only 5% of patients in both groups experienced an infection at the eight-week and six-month follow-up, while 30% of patients using the Champy plate experienced an infection during the two-week follow-up, compared to 55% of patients using the side plate techniques. By contrast, Ellis and associates found that a sample of 402 patients had an infection rate of 19% [52]. According to de Amaratunga, the infection rate was 13.7% when a tooth in the line of fracture was extracted and 16.1% when it was kept [53]. In Malanchuk and Kopchak's investigation, the overall infection rate was 24.7% [54]. 28.53% of 322 participants in 10-year retrospective study experienced problems [55]. Our study's high infection rate might be the result of many patients being removed from our cohort for failing to show up for their follow-up sessions, which most likely healed properly. Similar outcomes were obtained by Ellis and associates, despite the fact that they do not mention the administration of antibiotics after surgery [52]. Ellis and colleagues removed a tooth if the apical half or more was exposed, in addition to the standard

absolute indications to remove teeth in the line of fracture. In a population with a low socioeconomic status and, presumably, limited access to dental care, this was done to prevent the necessity for selective extraction later on. This is a sensible course of therapy, but if it raises the chance of infection at the fracture site—as our study showed—it may also raise the risk of more severe side effects, like osteomyelitis and non-union.

## conclusion

The foregoing study has led to the following conclusions. Males were 100 percent more likely than females to have mandibular fractures, with the biggest percentage occurring in those aged 20 to 29 (67.5%), followed by those aged  $\geq 30$  (17.5%). The most frequent cause of fractures was road traffic accidents, which were followed by bomb blasts (22.5%). Only 7.5% of patients had bilateral angle fractures, whereas 92.5% of patients had unilateral angle fractures. Compared to the Champy plate, the lateral plate approach for fixing mandibular angle fractures has a higher rate of complications. In comparison to lateral plate fixation, it was determined that the Champy plate is the most dependable and efficient management method for treating mandibular angle fractures, with extremely low rates of early and late complications.

## Declarations

### Limitations of the Study

The main limitation of this study was not including long-term follow-up.

### Data Availability

The accompanying author can provide the empirical data that were utilized to support the study's conclusions upon request.

### A Dispute of Interest

There are no conflicts of interest in regard to this project.

### Author's Contributions

Dr. Abdulgawi Nassar Al-Ya'ari: Formal analysis, conceptualization, data organization, and clinical and laboratory examinations to obtain a board's degree in Oral and Maxillofacial Surgery. All other authors supervised the work, reviewed the article, and approved the final version.

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