

Original Research

Mandibular gonial angle and mandibular angle fracture correlation in Kashmiri population: A radiographic study

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ABSTRACT:

Background: Fractures of the mandibular angle are common in occurrence. The present study was conducted to assess correlation of mandibular gonial angle and mandibular angle fracture. **Materials & Methods:** 50 patients undergoing treatment for mandibular fractures underwent panoramic radiographs using Newtom Giano machine. The gonial angle was measured digitally by drawing the tangent to the posterior border of the ramus and tangent to the lower border of the mandible. **Results:** out of 50 patients, males were 30 and females were 20. Fracture was involving angle in 12, symphysis in 7, body in 5, parasymphysis in 20 and condyle in 6 cases. The mean gonial angle in cases with angle fracture was 117.2 degree, in symphysis fracture was 116.4 degree, in body fracture was 114.3 degree, in parasymphysis fracture was 117.1 degree and in condyle fracture was 117.8 degree. In 6 patients with high gonial angle, mandibular angle fracture was present in 4 cases. Relative risk was -0.51 and p value was less than 0.05. **Conclusion:** There was no correlation between mandibular gonial angle and mandibular angle fracture.

Key words: Gonial angle, Mandibular angle fracture, Panoramic radiographs

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INTRODUCTION

Fractures of the mandibular angle are common in occurrence. The higher incidence has been attributed to the curvature at the angle region, presence of impacted third molar and height of mandible at the angle.¹ The poor quality of bone at the angle region has also been demonstrated as a cause of fracture. However, the impact of the mandibular growth pattern—the vertical or horizontal growth, on the incidence of angle fracture has not been studied so far. One of the important anthropometric features which describes the mandibular growth pattern is the mandibular gonial angle.²

Mandibular angle fracture is defined as the fracture line begins where the anterior border of the mandible ramus meets the body of the mandible and extends inferiorly through the inferior border or posteriorly extends towards the gonial angle.³ There are several factors associated with mandibular angle fractures such as the severity of the impact forces, biomechanical properties consisting of bone density, mass, and irregular anatomic structure, which may

exhibit lower resistance, presence of impacted third molar and high gonial angle.⁴

The mandibular angle is one of the most commonly affected regions with a prevalence of 12%–30% of all mandibular fractures. This region is designated as a triangular area with the superior edge being the junction of the horizontal body and vertical ramus usually where the third molar is or was located.⁵ The frequent involvement of mandibular angle in facial fracture areas can be attributed to (a) Thinner cross-section area. (b) Presence of third molar (c) Angle is subjected to muscle forces. There is also an abrupt change in shape from horizontal to vertical rami.⁶ The present study was conducted to assess correlation of mandibular gonial angle and mandibular angle fracture.

MATERIALS & METHODS

The present study was conducted among 50 patients undergoing treatment for mandibular fractures of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. A thorough clinical examination was performed. All underwent panoramic radiographs using Newtom Giano machine (NMT). The gonial angle was measured digitally by drawing the tangent to the posterior border of the ramus and tangent to the lower border of

the mandible. A value more than 128 degree was considered high and below 115.6 degree as low gonial angle. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 50		
Gender	Males	Females
Number	30	20

Table I shows that out of 50 patients, males were 30 and females were 20.

Table II Distribution of fracture site

Site	Number	P value
Angle	12	0.01
Symphysis	7	
Body	5	
Parasymphysis	20	
Condyle	6	

Table II, graph I shows that fracture was involving angle in 12, symphysis in 7, body in 5, parasymphysis in 20 and condyle in 6 cases. The difference was significant (P< 0.05).

Graph I Distribution of fracture site

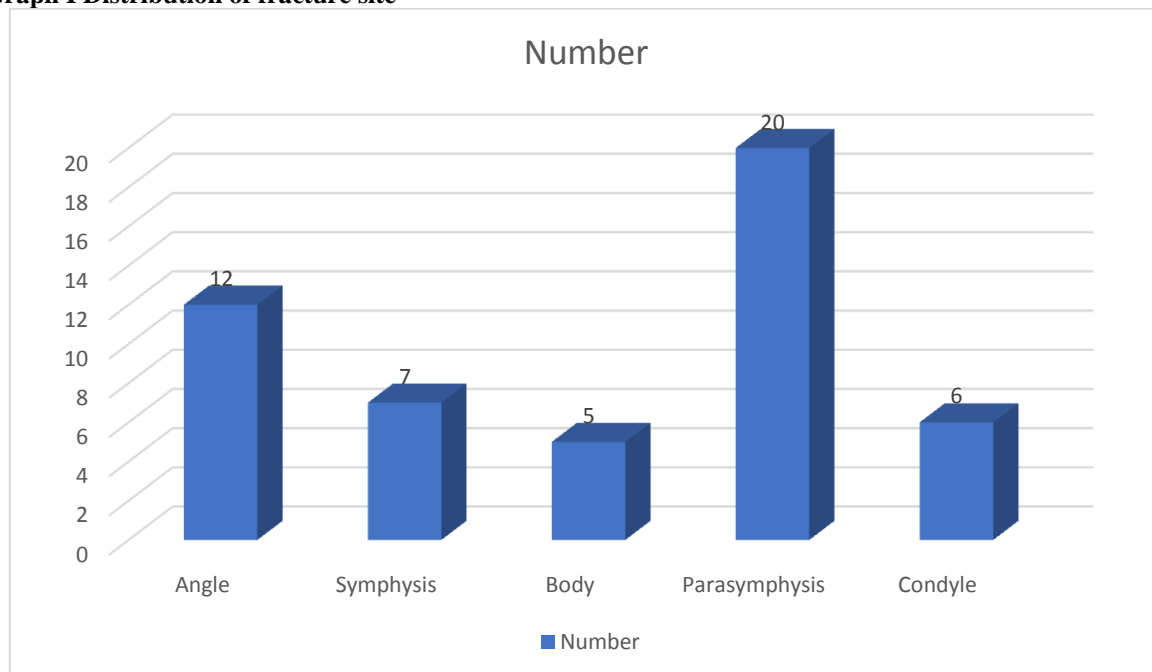


Table III Gonial angle based on site of fracture

Site	Mean (Degree)	P value
Angle	117.2	0.26
Symphysis	116.4	
Body	114.3	
Parasymphysis	117.1	
Condyle	117.8	

Table III shows that mean gonial angle in cases with angle fracture was 117.2 degree, in symphysis fracture was 116.4 degree, in body fracture was 114.3 degree, in parasymphysis fracture was 117.1 degree and in condyle fracture was 117.8 degree. The difference was non-significant ($P>0.05$).

Table IV Correlation of gonial angle and mandibular angle fracture

High gonial angle	Angle fracture present	Angle fracture absent	Total	RR
Present	4	2	6	-0.51
Absent	8	36	44	
Total	12	38	50	

Table IV shows that in 6 patients with high gonial angle, mandibular angle fracture was present in 4 cases. Relative risk was -0.51 and p value was less than 0.05.

DISCUSSION

Mandibular fractures represent between 35.54% and 44.2% of all fractures in the maxillofacial region.⁷ This high incidence is a result of the mandibular anatomy and characteristics.⁸ Mandibular fractures are the second most common fractures occurring after nasal fractures in the facial region. The mandibular angle is one of the most commonly affected regions with a prevalence of 12%–30% of all mandibular fractures. The mandibular gonial angle is an anthropometric parameter used to assess the growth pattern.⁹ It refers to the angle which is formed by the ramus line (RL) and the mandibular line (ML), where RL is the tangent to the posterior border of the mandible and ML is the lower border of the mandible through the gnathion. On the basis of the measurement of the gonial angle, individuals can be classified as having a high or low gonial angle or a vertical or horizontal grower.¹⁰ The present study was conducted to assess correlation of mandibular gonial angle and mandibular angle fracture.

In present study, out of 50 patients, males were 30 and females were 20. We found that fracture was involving angle in 12, symphysis in 7, body in 5, parasymphysis in 20 and condyle in 6 cases. Shroff et al¹¹ consisted of 294 orthopantomograms (OPG) of mandibular fracture. The sample was broadly divided into two groups, i.e. angle fracture group and non-angle fracture group. Gonial angle was measured digitally using software IWCR ROCKEY version 3.2 and status of third molar was assessed in the angle fracture group. The mean age of the patients is 30.29 ± 8 years. Out of 294 OPGs, 226 were non-angle fracture and 68 were angle fracture. The mean gonial angle of patients in angle fracture group was $117.91 \pm 7.74^\circ$, which was 0.9° larger than the non-angle fracture group (mean 117.03 ± 8.43 ; $P = 0.4427$). The third molar was present in 88% of angle fractures and 57% were impacted molar.

We observed that gonial angle in cases with angle fracture was 117.2 degree, in symphysis fracture was 116.4 degree, in body fracture was 114.3 degree, in parasymphysis fracture was 117.1 degree and in condyle fracture was 117.8 degree. Tiwari et al¹² included fifteen hundred articles published before August 2019 were identified. One hundred and

sixteen articles met the inclusion criteria. Two articles remained when exclusion criteria were applied. As measured in the two included studies containing 280 panoramic radiographs of mandibular fractures, the mean gonial angle of patients in the angle fracture group ranged from $126.8^\circ \pm 7.9^\circ$ to $128.5^\circ \pm 5.4^\circ$. The mean gonial angle of patients in the nonangle fracture group ranged from $118.5^\circ \pm 4.4^\circ$ to $122.3^\circ \pm 4.9^\circ$. The mean gonial angle of patients in the angle fracture group displayed a range from 118.9° to 134.7° (confidence interval [CI] 95% 5.89–8.05), whereas the mean gonial angle of patients in non-angle fracture group displayed a range from 114.1° to 127.2° .

We found that in 6 patients with high gonial angle, mandibular angle fracture was present in 4 cases. Elavenil et al¹³ comprised of 210 mandibular fractures; 70 mandibular angle fractures and 140 non-angle fractures. The Mean gonial angle in patients with mandibular angle fractures was 126.8 ± 7.9 degrees, which was 4.5 degrees more than in patients with other mandibular fractures ($p=0.0001$). Patients with high gonial angle were 11.77 times more likely to sustain an angle fracture than subjects with normal or low gonial angles.

Elias et al¹⁴ on CT also observed a mean gonial angle in the angle fracture group to be 131.3° as compared to 118.1° in the rest of mandibular fracture suggesting that an increase in gonial angle increases the risk of angle fracture.

CONCLUSION

Authors found that there was no correlation between mandibular gonial angle and mandibular angle fracture.

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