Sexual Dimorphism of the Mandible for Forensic Identification

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Introduction

Sex determination is one of the first steps in the identification of the individual whether for anthropologic reasons or victims of a mass casualty event or homicide. Forensic radiography continues to develop standards from which identification of remains is possible. The ability of a bone to exhibit characteristics unique to a particular sex is known as dimorphism. The mandible is an ideal bone to use as a standard due to its strength, durability, and intact recoverability. Studies were conducted on various measurements of the mandible to determine existence of sexual dimorphism. The mandible is dimorphic in its shape and size with male bones generally bigger and more robust compared to females.[1,2]

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Mandibular Measurements

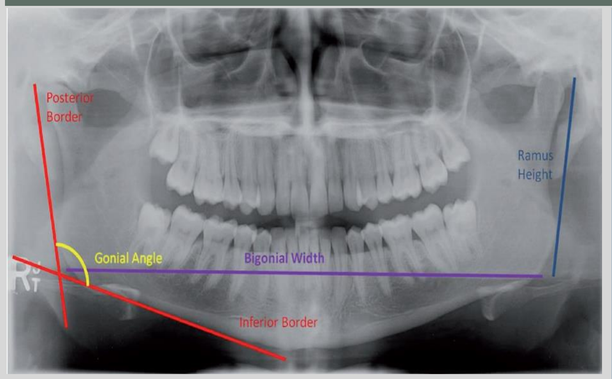

Fig. 1. Measurements of the gonial angle (yellow), ramus height (blue) and bigonial width (purple) on panoramic radiographs. [3]

TABLE 1: Gender differences in ramus height, bigonial width and gonial angle [3]

	Male Mean	Female Mean
Ramus Height	68.68	62.86
Bigonial Width	188.43	182.12
Gonial Angle	123.11	125.68

TABLE 2: Comparison of male and female with different variables in both right and left sides [2]

Side	Variable	Male Mean	Female Mean
Right	MxRB	36.67	33.77
	MiRB	24.10	22.01
	CH	65.01	59.48
	PHTR	63.69	57.91
	CoH	57.61	53.15
Left	MxRB	37.49	35.00
	MiRB	24.69	23.25
	CH	65.71	59.65
	PHTR	64.37	58.09
	CoH	58.52	53.40

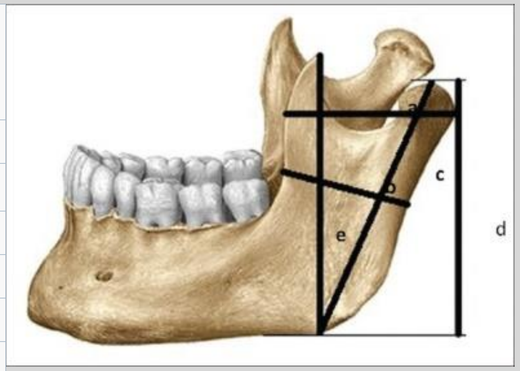

Fig. 2. Mandibular ramus measurements [2]

a= maximum ramus breadth (MxRB)
b= minimum ramus breadth (MiRB)
c= condylar/maximum ramus height (CH)
d= projected height of ramus (PHTR)
e= coronoid height (CoH)

Gonial angle measurements were greater in males than females. [1,2,4] In contrast, gonial angle was greater in females than in males in the Far North Queensland, Australia population study. [3] All studies showed a significant difference in bigonial width with male measurements greater than female. [1-4] The ramus height measurement showed the greatest dimorphism with males having a longer measurement than females. [1-4] Ramus height showed the strongest sexual dimorphism in terms of the projected height of ramus followed by the condylar/maximum ramus height. [2]

Conclusion

The mandible is an ideal bone to be used as a standard for sexual identification of human remains due to its durability and resistance to decay. All measurements of the mandible show dimorphic characteristics with ramus height showing the greatest significance. [1-4]

References

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