

MINI INCLINOMETER: A NEW COST EFFECTIVE AND SIMPLE DEVICE TO MEASURE SMALL ANGLES

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ABSTRACT

Measurement of different angles of articular surface, their inclination in different cardinal planes and angles formed at bifurcation of arteries is of utmost importance for various surgical and orthopedic procedures. The present work is an attempt to develop an instrument to measure the angle of inclinations of small articular surfaces.

Key words-Inclinometer, angle of inclination, dens axis sagittal angle, leveler, protractor.

INTRODUCTION

Measurement of different angles of articular surface, their inclination in different cardinal planes and angles formed at bifurcation of arteries is of utmost importance for various surgical and orthopedic procedures^{1,2}

The angle of inclined surfaces of articular facets of vertebrae is important as articular facets guide the extent and direction of vertebral movements. The orientation of articular facets changes from cervical to lumbar region^{3,4}. The knowledge of angle of tilt of odontoid process of axis vertebra in sagittal plane hold a paramount place in cases of odontoid fracture where the reduction is done by anterior screw fixation⁵. Similarly knowledge of the angle of bifurcation of coronary arteries provides a better understanding of its association with various arterial diseases such as atherosclerosis and its surgical management.

During our work on anthropometric assessment of various surfaces of the atlas and axis vertebrae we felt the need of an instrument which can measure different angles i.e. frontal angle of superior articulating facets, dens axis sagittal angle, with minimum errors. But our attempt to find such instrument was unsuccessful. So we tried to make such a device using easily available material for solving our problem.

MATERIAL AND METHOD

Material included geometrical protractor (Therion

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protractor), a bubble leveler, metal sheet and few small screws.

Two protractors were cut in two equal halves such that one half bears the markings from 0° to 90°. One half protractor was then fixed at right corner of lower border of metal sheet with a screw such that it can be rotated around the screw as its axis (Fig.1). A bubble leveler was fixed over the turned part of metal sheet at upper border to maintain the lower border of instrument in a horizontal plane. Second half protractor was modified and attached at left corner of the lower border of the sheet and the lower side of left border was cut in such a way that it can be used for the measurement of tilt of odontoid process of axis vertebrae (Fig. 1)

To measure the inclination of articular facets of selected vertebrae, the right corner of the lower border of instrument was kept at highest point of the inclined surface and lower border of instrument was maintained in the horizontal plane with the help of bubble leveler (Fig. 2). The protractor was moved downward till it touched the lowest point over the inclined surface and tilt of protractor was measured in degrees indicating the angle of inclined surface [θ1] (Fig.3). Similarly, the left end of the instrument can be used to measure the tilt of odontoid process in sagittal plane [θ2] (Fig. 4).

CONCLUSION

We successfully used this instrument to measure different angles of atlas and axis and found that this instrument is simple to operate, cost effective and reliable. This instrument can be used to measure other angle of bones and angles of bifurcation of arteries directly in cadavers and hence can be used in research work for same purpose.

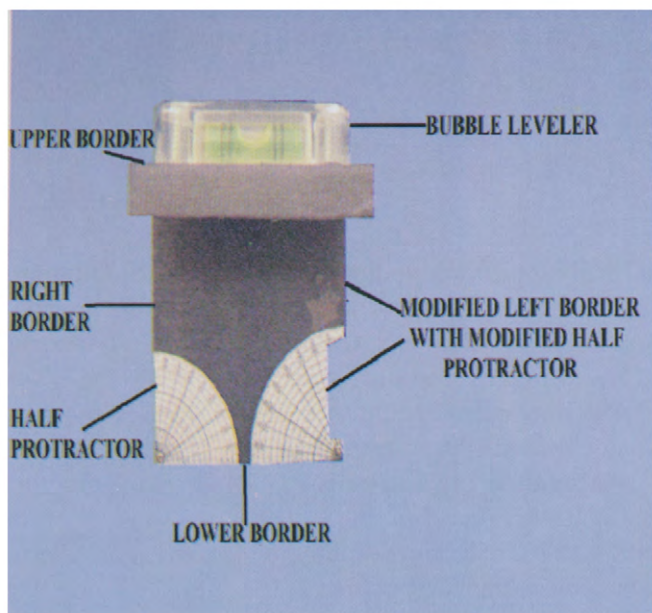


Fig.1 : Mini Inclinometer

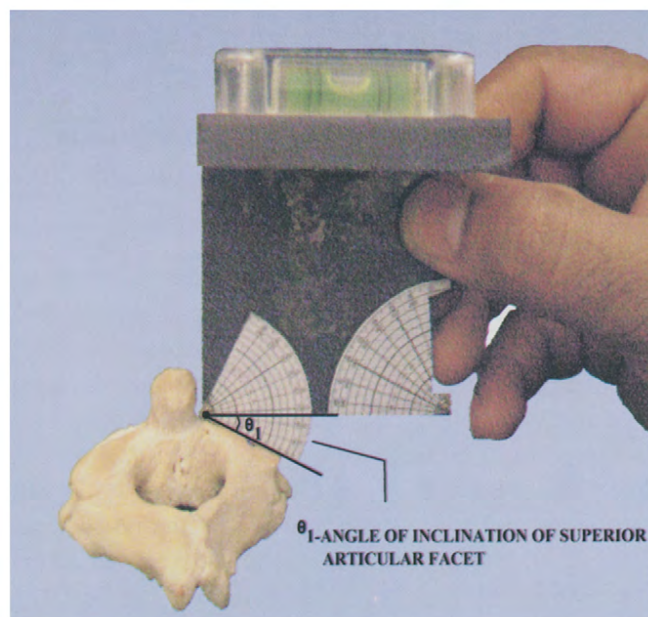


Fig.3 : Showing measurement of angle of inclined surface

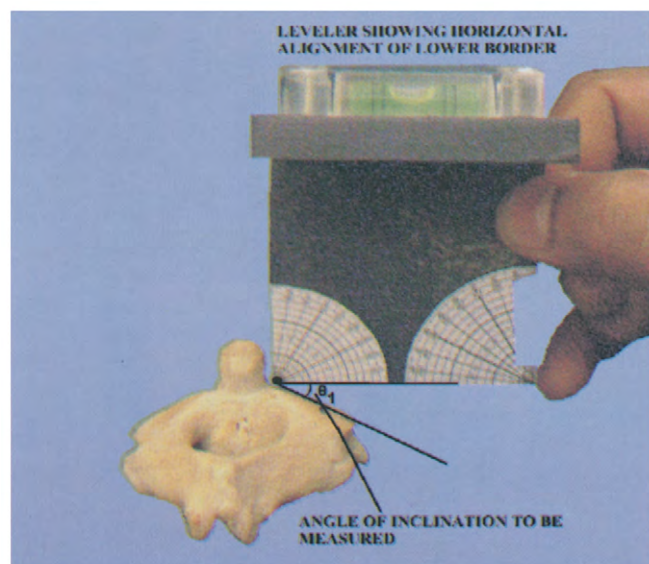


Fig.2 : Shows how to hold the instrument while measurement

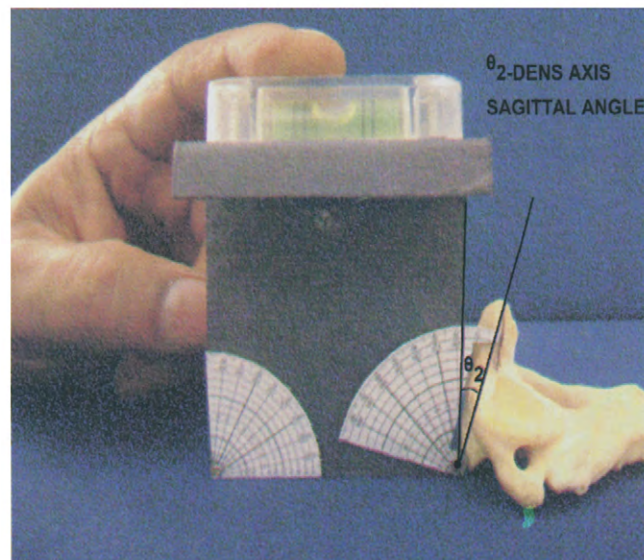


Fig.4 : Showing measurement of tilt of odontoid process

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REFERENCES

1. Sengal G and Kadioglu HH: Morphometric anatomy of the atlas and axis vertebrae. Turkish Neurosurgery 2006; 16(2) 69-76.
2. Cacciola F, Phalke U, Goel A : Vertebral artery in relationship to C1-C2 vertebrae: An anatomical study. Neurology India 2004; 52(2) 178-184.

3. Patel MM and Singal TC :Modification of protractor to measure the sagittal angle of superior articulating facet of vertebrae. J. Anat. Soc. India 2003; 52(1):15.
4. Patel MM, Gohil DV, Singal TC: Orientation of superior articulating facets from C3 to S1 vertebrae. J. Anat. Soc.India 2004; 53(2):35-39.
5. Naderi S, Arman C, Guvencer M, Korman E, Senoglu M,Tetlk S, Arda MN: Morphometric Analysis of C2 body and the odontoid process. Turkish Neurosurgery 2006; 16(1) 14-18.