Platybasia and the Relationship of the Odontoid to the Palatal Line

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Introduction

Surgical approaches to the craniocervical junction have recently expanded beyond the traditional open transoral approach, to include endoscopic endonasal, endoscopic endooral or combined approaches. However, little data exists in the literature describing the anatomic relationships of the craniocervical junction from an endoscopic perspective. The height of the craniocervical junction relative to previously accepted anatomic references, such as McGregor’s line and Chamberlain’s line, does not directly relate to the view achieved from an endonasal approach. In order to establish the minimal plane of access of an endoscope, we propose the palatal line, a line drawn along the floor of the nasal cavity parallel to the hard palate and extending back to the craniocervical junction.

In clinical practice we have noted variability in the height of the odontoid over the plane of the nasal cavity floor. Preoperative assessment of the odontoid position relative to the palatal line, using mid-sagittal CT or MRI imaging can aid in selecting an endo-nasal, endo-oral or combined approach.

Platybasia is flattening of the skull base to clival angle. We questioned whether flattening of this angle leads to an increased elevation of the odontoid and craniocervical junction above the level of the palatal line. We therefore undertook this study to determine if platybasia is associated with an increased height of the odontoid over the palatal line and to introduce the palatal line as a method by which to select the appropriate approach to craniocervical junction.

Methods

Design: Retrospective Radiographic Review

Control Population Chronic Rhinosinusitis Patients
Study Population: Platybasia Patients

Methods: Medical records were searched for the ICD-9 code 473.49 (chronic rhinosinusitis) and 756 (skull base anomalies) over a ten year period (1-1-2000 to 1-1-2010). Patients were greater than 18 yrs old and had no prior surgery at the craniovertebral junction. Patients within the skull base angle (nasion - mid-sella - basion) were measured using Phillips I-Site Version 3.6 software. Measurements were taken to the nearest degree and to 0.1mm. A total of 32 platybasia patients and 186 chronic rhinosinusitis patients were analyzed.

Results

1. Test the hypothesis that platybasia results in an increased height of the odontoid process above the palatal line.
2. Describe the palatal line (a straight line drawn parallel to the horizontal axis of the hard palate) as a method for assessing the best approach (endo-nasal, endo-oral or combined) to access the odontoid process.

Objectives

Fig 1: Example of Anterior Skull Base Angle and Palatal Line

Fig 2: Graph of mean anterior skull base angle among control and platybasia patients (p<0.0001).

Fig 3: Graph of mean odontoid height relative to the palatal line among control and platybasia patients (p<0.0001).

Fig 4: Graph of mean clival height relative to the palatal line among control and platybasia patients (p<0.0001).

Fig 5: Graph showing absence of linear relationship between anterior skull base angle and odontoid height relative to the palatal line (r=0.17 control, r=0.11 platybasia).

Fig 6: Graph showing absence of linear relationship between anterior skull base angle and clival height relative to the palatal line (r=0.19 control, r=0.12 platybasia).

Fig 7: Graph showing linear relationship between odontoid and clival height relative to the palatal line (r=0.94 control, r=0.82 platybasia).

Conclusions

1. Platybasia patients have a higher odontoid height relative to the palatal line.
2. The lack of linear relationship between the odontoid (or clival) height relative to the palatal line and anterior skull base angle suggest odontoid elevation in Platybasia is not due to the increased angle at the skull base.
3. A linear relationship exists between clival height and odontoid height relative to the palatal line. The variable for this relationship is as of yet unidentified.
4. Variability exists in the relative position of the odontoid to the palatal line. Therefore, the palatal line is useful in predicting the necessary surgical access to the odontoid and should include consideration for an endo-nasal, endo-oral or combined endoscopic approach.

References