Roentgenographic Cephalometry - An Aid in Unsuspected Abnormalities

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INTRODUCTION

In 1931 Broadbent pioneered and introduced a precise technique for taking standardized head radiographs thus providing a valuable means for the investigation of facial and cranial growth. This tool has been of great interest to the orthodontist, for it has enabled him to better understand the position of the dentition in relation to the craniofacial skeleton, and the variations in the dentofacial morphology with particular emphasis on measurements of the changes due to growth and development. The integration of this knowledge provides him with information regarding the differential diagnosis, treatment planning, prognosis, and perhaps assists him in choosing the appliance necessary to guide the movement of the teeth.

Orthodontists have found in cephalometrics a means for broadening their understanding of diagnosis and treatment planning. With the increased attention, a number of diverse dentofacial clinical analyses have been developed. These analyses, without question, have helped the practicing orthodontist in clinical evaluation of his patients. Unfortunately, some practitioners have made these dentofacial analyses simply a mechanical procedure.

We accept this approach as a necessary adjunct to our diagnostic armamentarium but we also must certainly accept our responsibility to take the time to examine the radiographs critically, not only for an overall appraisal of the facial pattern we are evaluating, but also for any of the various abnormalities or pathological processes which may be present. We cannot allow ourselves to forget that the field of orthodontics is concerned with the health of the entire cranial and facial structures.

We will describe four cases which were detected incident to roentgenographic cephalometry, and are unique and warrant special attention. These cases were referred for orthodontic treatment to the Department of Orthodontics at the West Virginia University. They were routine orthodontic patients and presented no unusual clinical symptoms. During the course of examining and taking routine diagnostic records, the various abnormalities or pathologic processes were detected.

In this presentation attention is directed only to the individual's pathological processes, without going into the details of types of malocclusion. All these cases were later referred to the Medical Center, West Virginia University, for further investigation.

CASE REPORTS

Case No. 1. R. C., white female, aged 7 years, revealed on the lateral and frontal roentgenograms a metallic rivet in the right nostril just above the anterior nasal spine (Fig. 1). The foreign bodies are often inserted into the

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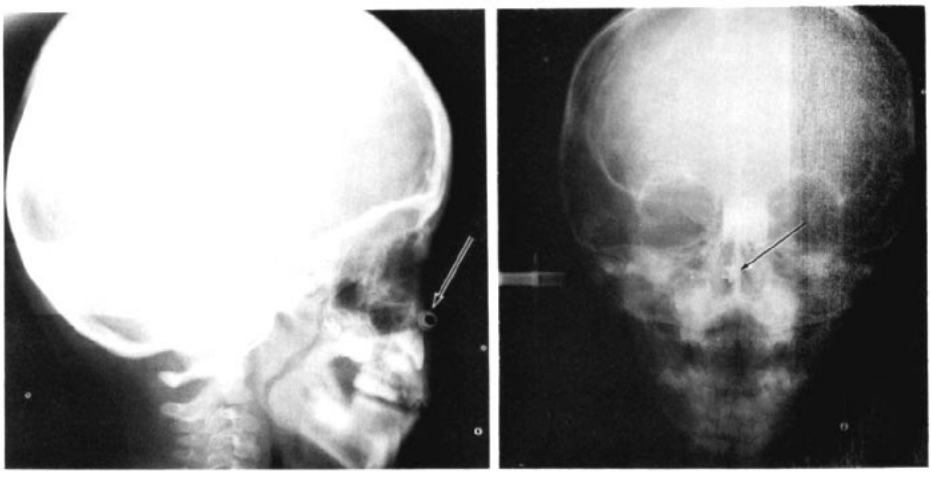

Fig. 1. A metallic foreign body in the right nostril just above the anterior nasal spine.

nostril by young children. They are usually found by accident through roentgenographic examination of the sinuses, when the parents notice a chronic nasal discharge. If the foreign body is nonopaque, it is more difficult to recognize. Such types of foreign objects sometimes develop into medical emergencies when the object is inhaled into the lung.

Case No. 2. J. G., white male, aged 12 years, was noted to have a cystic density in the inferior angle of the left and right maxillary antrum (Fig. 2). There was no evidence of erosion of the bone. The left frontal sinus was very poorly developed in relation to the right. This patient was referred to the otolaryngologist and his condition was diagnosed as retention cyst of the bi-

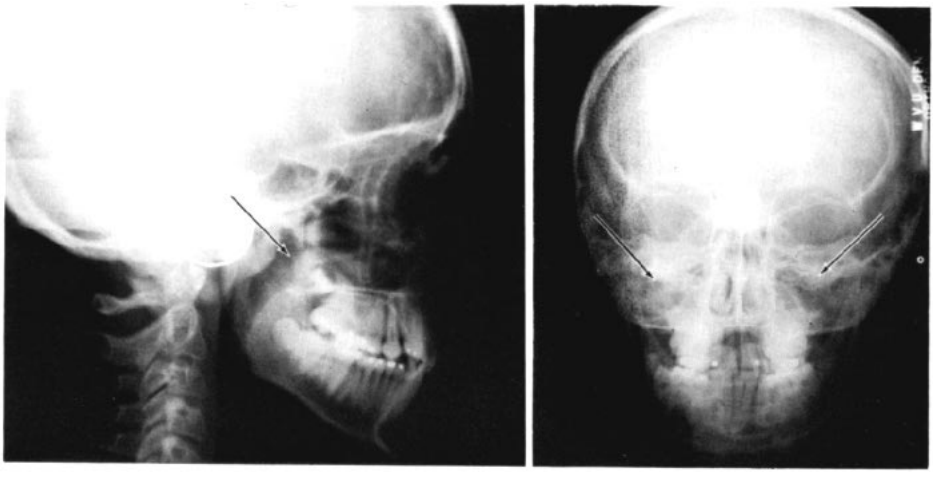

Fig. 2. Retention cysts of both the maxillary sinuses, lateral and frontal film demonstrated a well-defined radiolucent area.

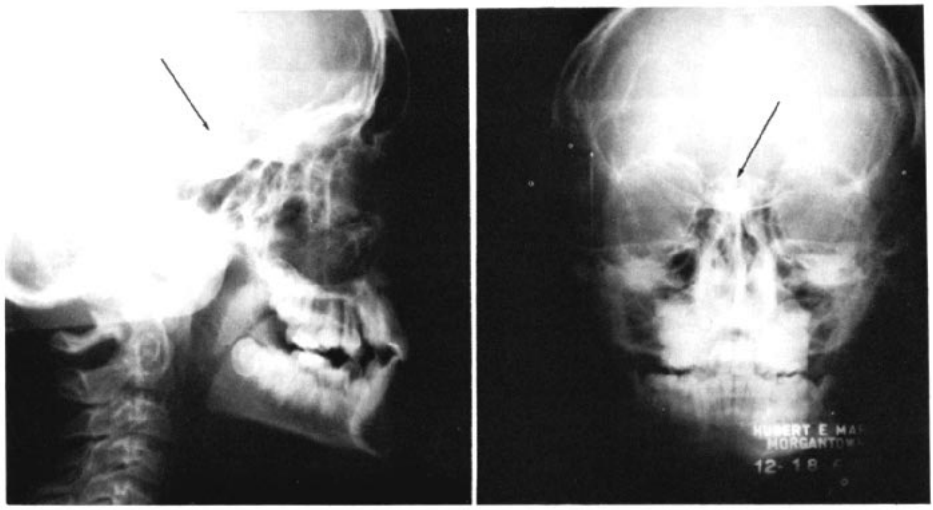

Fig. 3. A well-defined calcified tooth-like structure in the area of tuberculum sellae and sella turcica.

lateral maxillary sinus with no evidence of malignancy. These lesions were entirely asymptomatic.

Case No. 3. E. G., white male, aged 13 years. Examination of the lateral and frontal head roentgenograms (Fig. 3) revealed a dense well-defined tooth-like structure in the area of tuberculum sellae and partially in the sella turcica. The anterior clinoid processes were not well defined and the shape of sella appeared to be flat with its anteroposterior diameter greater than in normal individuals. This was provisionally diagnosed as an unusual intrasellar cyst with a tooth or a dermoid. The tooth in the sellar area has both clinical and embryonal interests.

Neoplastic lesions of the suprasellar and pituitary groups are basically craniopharyngiomas, cysts, and adenomas. The craniopharyngiomas cause compression of adjacent structures resulting in severe physiologic disturbances such as visual, intracranial hypertension, hypophyseal and hypothalamic disorders.

Craniopharyngiomas (Rathke's pouch tumor) and the sellar cyst are thought to have their histogenesis from residual cells of the primitive craniopharyngeal duct. The epithelial component, cellular morphology and the embryonal explanation support this concept.

In embryogenesis the pituitary gland is formed by two processes, one from an invagination of Rathke's pouch which comes in from below and forms the anterior lobe and one from the floor of the third ventricle, which comes from above forming the posterior lobe. Since Rathke's pouch is lined by primitive oral epithelium, it would be possible that some cells of this epithelium could differentiate into cells like those of the dental lamina, or possible parts of the dental lamina could be ectopic in the area of Rathke's pouch and included in the craniopharyngeal duct. In any event, cellular structures simulating the primitive enamel-forming organ are characteristic of a craniopharyngioma. Epithelium simulating stratified squamous epithelium lines the cavities of suprasellar cysts.

The above statement appears to be the best explanation of the finding in this lesion. The presence of pluri-poten-

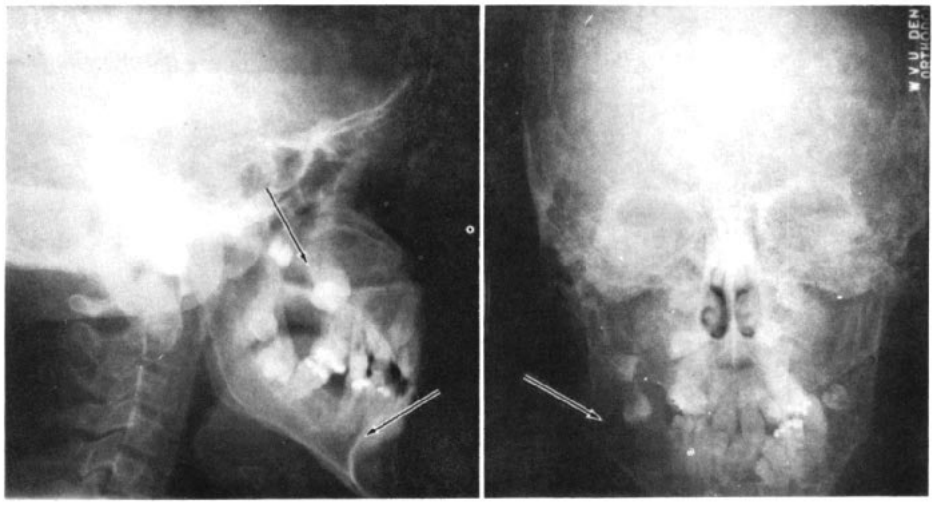

Fig. 4. Lateral and frontal x-ray showing extensive cystic areas involving angle of mandible, symphyseal area and the maxilla. Note that the teeth are displaced.

tial primitive cells undergoing histodifferentiation has also been cited as a possible histogenesis of the craniopharyngioma and suprasellar cysts. This case is still under investigation.

Case No. 4. C. G., white male, aged 15 years, roentgenographic examination of the lateral and frontal head plates disclosed expanding cystic areas involving the mandible (at the left posterior mandibular angle) and the maxilla bilaterally with an associated displacement of the teeth (Fig. 4). The sella was unusually shallow with developmental interclinoid bridging. This patient was later referred to the pediatric clinic and the condition was diagnosed as a combination of multiple basal-cell carcinomas, cysts of the jaw and skeletal deformities, often referred to as the basal cell nevus syndrome.

Comments and Conclusions

The conditions presented here in four cases, discovered during routine orthodontic diagnosis, are of major medical significance. In such cases, the importance of the broadened scope of orthodontic diagnosis can not be too much emphasized.

As orthodontists, we should be especially cognizant of this opportunity. Since the majority of our patients are children, the possibility of early detection of pathology is readily apparent.

A thorough understanding and experience in interpreting the head x-ray is, of course, necessary. However, an attempt should be made by all the practicing dentists who use cephalometrics to carefully observe the entire radiograph.

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