

RADIOGRAPHIC AND 3D CT (VRT) SCAN EVALUATION OF INCISIVE FISSURE IN A PLASTINATED FETUS

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ABSTRACT

Incisive fissure is a well known anatomical structure in human palate. The term incisive fissure, given by Wood et al, was previously regarded as incisive suture. Incisive fissure on a radiograph is seen as bilateral radiolucent line on the palate during early fetal life. It disappears with age and generally cannot be seen on the palatal and nasal aspect of the adult skull. Plastination is a technic of preparing a dry, colored, nontoxic, durable, odorless, natural looking specimen. A human fetus of gestational age 24 weeks was plastinated, radiographs and 3D CT (VRT) Scan of the fetus was taken. The obtained images were studied and results were drawn.

KEY WORDS : Incisive fissure, Human plastinated fetus, Plastination, Incisive suture.

INTRODUCTION

Incisive fissure is a well known anatomic structure in the human palate.¹ This fissure was referred to as incisive suture or premaxillary suture or sutura incisiva because it was believed that this fissure in adult skulls represented the remnants of the suture that once completely separated the maxillary and premaxillary bones.² The incisive fissure on the palate of young human skulls runs bilaterally from the incisive canal to the lingual border of the alveolar ridge between the lateral incisor and canine tooth where it terminates abruptly it extends superiorly through the bone of the anterior hard palate where it runs laterally from the superior aperture of the nasopalatine canal along the bony nasal floor to the lateral walls of the nasal cavity, it curves superiorly up the medial surface of the lateral wall and terminates approximately half way between the floor of the nose and the superior tip of the frontal process. The incisive fissure disappears with age and generally cannot be seen on the palatal and the nasal aspect of the adult skull. Incisive fissure has not been demonstrated on the facial aspect of a normal human postnatal skull.³

The presence or absence of incisive bone, premaxilla and intermaxillary bones in human is the subject of an anatomical controversy since the time of Vesalius. Galen in the second century described

human incisive bone based upon animal dissections. Vesalius discovered an anterior transversal suture on the oral side of the human maxillary palate, but because of the absence of this suture on the facial aspect he concluded that incisive bone is absent in man. There are different opinion regarding number of ossification center in human upper jaw.

Some authors believed that human upper jaw bone develops from a single ossification line bilaterally and not from the fusion of two bones while most of others stated that it arise from two centers one from actual maxillary bone and the other premaxillary part of maxilla.⁴

Plastination is a unique technique of tissue preservation. It is relatively simple to do economical and done with commonly available materials such as silicone, epoxy resin and polyester. The technique stemming from the ground work of Dr.Gunther Von Hagens at university of Heidelberg, Germany in the year 1978.⁵ A plastinated specimen is dry, clean, odorless, durable and is non toxic, non carcinogenic, requires no special care or storage. Plastinates are accurate human tissue representation⁶. This study aims to describe the morphology and development of incisive fissure in a plastinated fetus.

Materials and Methods

The study includes a human fetus of gestational age 24 weeks, which was plastinated in the Department of Anatomy, JSS Medical College, Mysore. Following Plastination Radiograph and 3D CT (VRT) Scan of plastinated fetus were taken in Animal Research Center, Mysore following proper infection control. The Radiograph of palate of plastinated fetus to study Incisive Fissure was taken using Intraoral Periapical Film (size 22x35mm) by NOMAD Handheld X-Ray machine, Aribex, Inc. USA. 3D CT (VRT) Scan of plastinated fetus was done using 16 slice CT scan machine, Siemens Company, USA. Then obtained Radiographic and 3D CT scan images were studied and results were withdrawn.

Results

Intraoral periapical radiograph of palate shows bilateral transversal radiolucent line located dorsally to the germs of the incisor teeth extending from the incisive canal to the interval between the germs of lateral incisor and canine. Anterior to this radiolucent line, the calcification grew around the germs of incisor teeth. Dorsally it is growing from the lateral part of palate towards medially (Fig. 1). The axial CT scan images at the level of palate shows incisive fissure running bilaterally from incisive canal up to alveolar ridge of maxilla (Fig. 2). The 3D VRT (Volume rendering technique) images at palatal level showed muscle and soft tissue attachments of bone (Fig. 3).

Discussion

Controversies exist concerning the prenatal osseous development of human upper jaw. Although there is a general agreement that two parallel frontal process maxillary and premaxillary which are separated by incisive fissure arise from early ossification line bilaterally, there have been different opinion how the incisive fissure is obliterated on the facial aspect. For many years anatomy text² have shown that the human upper jaw bone is formed in early embryonic life from the fusion of premaxillary and maxillary bones.

According to vacher this suture is an ontogenetic vestige of evolution in fetal palate growth, and its meaning must be considered from a phylogenetic viewpoint. Mareille noted an important delay in the synostosis of the incisive suture, in

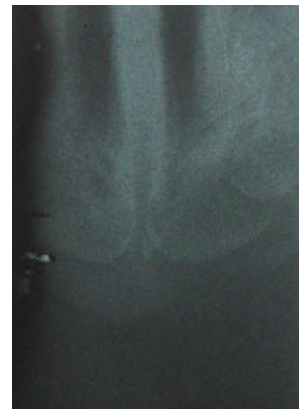


Fig 1: Radiograph of palate of a fetus aged 24 weeks after conception.

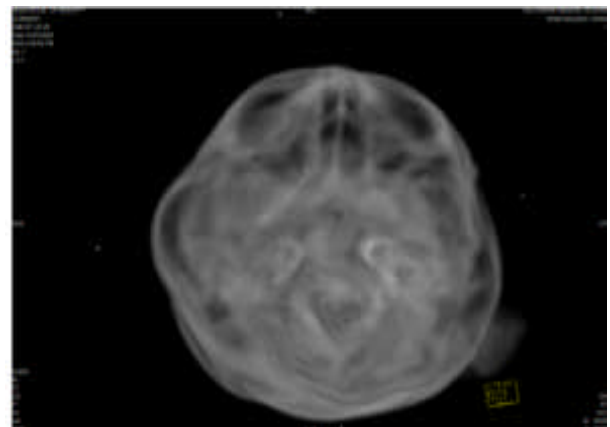


Fig 2: Axial CT scan image at the level of palate.

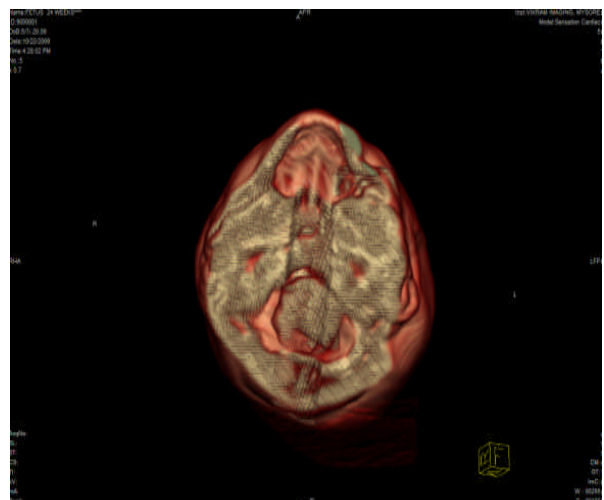


Fig.3: The 3D VRT (volume rendering technique) image at the level of palate.

Neanderthal children in comparison with modern children. ([Mareille and Houët, 1993](#); [Mareille and Bar, 1999](#)).⁷ In terms of evolutionary morphology, the existence in the human fetus of a partial osseous suture, which is ossified during fetal life, in a unique maxillary osseous piece, can be considered as a phylogenetic vestige of the suture between the incisive bone, present in all nonhuman mammals, and the maxillary bone. ([Sakka, 1977, 1983](#)). [Broom \(1934\)](#) and [Genet-Varcin \(1969\)](#) described an incisive bone visible in the facial aspect of *Australopithecus africanus*. Although a separate incisive bone is not described in more recent fossil specimens. These observations tend to confirm that this suture is a phylogenetic vestige of the incisive bone in man.⁴

The incisive fissure does not correspond to the site of primary palatal fusion ([Lisson and Kjaer, 1997](#)). This site of junction is marked only by the persistence of a TMN that was observed on the oral aspect of the human fetal palate.⁸

According to our results, on the radiographic study of the fetal palate of 24 weeks after conception, the part of the maxilla located ventrally to the incisive fissure is almost totally occupied by the dental germs surrounded by a very thin calcification line. Incisive fissure is present as a radiolucent line on the human palate during early fetal life, which shortens during fetal growth and these findings tend to confirm [Nijo and Kjaer's \(1993\)](#) results.¹

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