

Osteoma of the Skull Base and Sinuses

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KEYWORDS

- Osteoma • Draf type 3 procedure • Endoscopic procedures
- Endoscopic modified lothrop

EBM Question	Level of Evidence	Grade of Recommendation
What are the limits of the endoscopic approach?	4	C

Osteoma is a benign, slow-growing bone tumor consisting primarily of well-differentiated mature, compact, or cancellous bone. Osteoma is the most common benign tumor of the paranasal sinuses with a point prevalence of 3%, as demonstrated in 2 computed tomography (CT) radiological studies of 1500¹ and 1889² patients respectively.

AGE AND SEX

Osteomas occur more often in men, with a variable male-to-female ratio of 1.3:1.0¹ to 1.5:1.0.^{2,3} Their peak incidence is between the fourth and sixth decades, with an average age at presentation of 50 years.^{1,2}

LOCATION

Most osteomas (58%¹ to 68%³) involve the frontal sinus (37% arise in the immediate vicinity of the nasofrontal duct and 21% above and lateral to the frontal ostium).¹ The

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ethmoid sinus is the second most common area to be involved, whereas maxillary sinuses are affected in about 20% of cases, and sphenoid sinuses are rarely involved.¹ Osteomas can occur in conjunction with Gardner syndrome (familial adenomatous polyposis) (**Fig. 1**), an autosomal dominant condition consisting of multiple osteomas, soft tissue tumors (including skin cysts and desmoid tumors), and colon polyps with a high propensity toward malignant transformation.⁴ As osteomas tend to appear an average of 17 years before the colon polyps, early gastroenterology referral is strongly advised.⁵

ETIOLOGY OF OSTEOMA

There are 3 main pathogenetic theories regarding the etiology of osteomas: developmental, traumatic, and infective.^{6,7} According to the developmental theory, as proposed by Cohnheim, osteomas arise from stem cells of the junctional area between the frontal and ethmoid bone. This is supported by the fact that osteomas frequently occur at the fontoethmoid suture line where the frontal sinus (membranous bone) borders the ethmoid labyrinth (endochondral ossification). However, this theory does not explain osteomas found in other locations. The traumatic theory, as proposed by Gerber, suggests that osteomas arise as an abnormal proliferative response to trauma and is supported by both the higher incidence of osteomas in men and the development of osteomas during puberty, when the rate of skeletal development is at its peak.⁸ However, most osteomas are detected later in life and the great majority of patients do not report any history of trauma, whereas an increased incidence of osteomata in patients undergoing multiple endoscopic sinus surgery procedures has never been documented. Alternatively, it has been suggested that osteomas may arise as a result of infection stimulating osteoblasts within the mucoperiosteal lining of the sinus, which in turn may become secondarily calcified. Although there is an association between osteoma and sinusitis, the cause-and-effect relationship is not clear, and in up to 63% of cases, osteomas arise in healthy sinuses.² Other less substantiated theories suggest that osteomas may be osteodysplastic lesions, osteogenic hamartomas, embryonic bone rests, or the result of ossification of sinus polyps. However, none of these hypotheses have been proven.⁴



Fig. 1. A 51-year-old patient with Gardner syndrome. Note the multiple osteomata of the facial skeleton occurring in unusual locations, including the orbita, maxillary sinus, and zygomatic bone.

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