

Incidence of chronic hyperostotic rhinosinusitis in patients undergoing primary sinus surgery compared to revision surgery*

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SUMMARY

Hypothesis: The incidence of chronic hyperostotic rhinosinusitis has been underreported due to poor recognition of the disease process. The surgical management of chronic hyperostotic rhinosinusitis with prolonged pre and post-operative antibiotic therapy can alter clinical course of the disease process.

Study Design: A prospective study of 40 patients based at two teaching tertiary care institutions.

Material and methods: CT scans of twenty patients (ten undergoing primary sinus surgery and ten undergoing revision sinus surgery) were randomly selected from each institution and reviewed by an independent radiologist for evidence of hyperostosis and compared to original reading of the CT scans.

Results: The finding of sinus hyperostosis is rarely reported by the radiologist on the sinus CT scan where the focus is always on mucosal disease. The incidence of sinus hyperostosis is higher, in patients undergoing revision sinus surgery than patients undergoing primary sinus surgery.

Conclusion: Sinus hyperostosis is not an uncommon finding in chronic refractory sinusitis which may require long term intravenous antibiotic therapy in conjunction with surgery to provide symptomatic relief.

Key words: CT scans, hyperostosis, sinusitis

INTRODUCTION

Despite the advances in medical and surgical management of sinus disease, many controversies persist and questions remain unanswered especially in relationship to bony thickening in chronic hyperostotic sinusitis. Chronic sinusitis is defined as signs and symptoms of inflammation of the paranasal sinuses persisting more than 8-12 weeks duration with persistent inflammation documented with imaging studies after appropriate medical therapy (Kennedy, 1995). CT scan is the radiographic study of choice to evaluate the nose and the paranasal sinuses (Figure 1). CT scan imaging provides good detail of both mucosal disease and bony anatomical changes (Zinreich, 1987). Patients with chronic sinusitis and those who require revision sinus surgery increasingly demonstrate bony thickening at the site of inflammation. Many patients can localize signs and symptoms of sinus inflammation to the site of bony thickening, yet there is poor understanding of this process as the site of origin of the pathology is not clear (Kaliner, 1997). Based on these observations, we designed a prospective ran-



Figure 1. A normal CT scan of the paranasal sinuses without hyperostosis.

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domized study to find the incidence of chronic hyperostotic sinusitis, awareness of bony changes by radiologists and possible interventional strategies in its treatment.

MATERIAL AND METHODS

Forty adult patients were randomly selected from patients referred to the authors at two tertiary care teaching hospitals in New York City. Twenty patients were referred for primary sinus surgery and twenty other patients who had previous sinus surgery for revision surgery. Any patients who had previous external surgery such as external ethmoidectomy or Caldwell-Luc procedure were excluded from the study (Figure 2) as external open procedures cause severe hyperostosis of the sinus involved. Other exclusion criteria included less than 18 years, pregnancy or bone disease due to other causes.

All patients underwent sinus CT scans using identical window settings, which were read by the radiologists who were not participating in the study. These CT scans were then reviewed by an independent radiologist for sinus hyperostosis (Figure 3 and 4). The CT scan results of the original reading and review were compared. Also CT scan studies were graded using the Lund-Mackay classification for severity of sinus disease (Lund, 1995)



Figure 2. CT scan showing hyperostosis related to a previous Caldwell-Luc procedure.

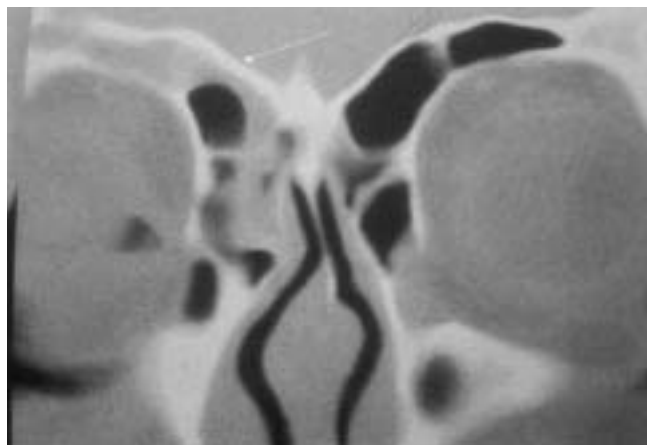


Figure 3. CT scan showing hyperostosis related to chronic infection in presence of previous surgery.



Figure 4. CT scan showing hyperostosis related to chronic infection in presence of nasal polyposis.

RESULTS

There were 25 males and 15 females in the study. The age ranged from 24 years to 64 years. Four patients (20%) in the primary surgery group and 13 patients (65%) in the revision surgery group had CT scan evidence of hyperostosis. Two patients in the primary surgery group and 3 patients in the revision surgery group who had hyperostosis were reported at the initial reading compared to 4 and 13 respectively, at the time of review. There was no correlation between the Lund-Mckay classification of the affected sinus and presence of hyperostosis. There was no association between sex of the patient or age with hyperostosis. There was a correlation between massive polyposis and presence of hyperostosis (5/5, 100%).

DISCUSSION

Most otolaryngologists consider failure of maximal medical therapy, which includes prolonged antibiotic therapy as an indication for sinus surgery. The work-up prior to surgery include a CT scan of paranasal sinuses but both the radiologist and the otolaryngologist tend to focus on mucosal disease or localized bony changes such as osteomas. Diffuse bony changes termed as hyperostosis - an indicator of chronic sinusitis is often overlooked. Also inflamed mucosa often obscures the fine bony detail, resulting in a sub-optimal reading. Most of staging systems which grade sinus disease based on CT scans do not take into account the bony changes.

Both human and animal models have shown that chronic sinus infection causes not only mucosal changes such as edema, goblet cell hyperplasia, mucosal hypertrophy and metaplasia but bony changes such as periosteal reaction, chronic inflammatory cellular infiltrate, bony resorption and osteoneogenesis. (Norlander, 1994; Westrin, 1992). The bony histological changes present as diffuse sinus hyperostosis on sinus CT scan. These changes correlate to persistent sinusitis symptoms, which are refractory to conventional management including prolonged oral antibiotic treatment.

Kennedy et al. (1998) used techniques of undecalcified bone analysis to detailed histologic examination of ethmoid bone in

chronic sinusitis and compared it with controls. Bone synthesis, resorption, and inflammatory cell presence were assessed. The study revealed that individuals undergoing surgery for chronic sinusitis had histologic changes including new bone formation, fibrosis, and presence of inflammatory cells and suggested that underlying bone may serve as a catalyst for chronic sinusitis (Kennedy et al., 1998).

Chronically infected sinus bony loses its normal laminar structure and becomes honeycomb like, which harbor bacteria causing chronic infection which tends to persist due to low penetration of antibiotics and absence of inflammatory cells. These patients with chronic hyperostotic sinusitis when diagnosed require prolonged pre- and post-operative intravenous antibiotic therapy to achieve adequate levels in the serum for proper response. Control of bone infection should assist in the treatment of chronic sinusitis as well as improve the success of endoscopic functional sinus surgery.

The role of intravenous antibiotics in the management of chronic hyperostotic sinusitis is still not defined. But in contrast, the role of intravenous antibiotics in chronic osteomyelitis is well defined. By comparing management of chronic osteomyelitis to chronic hyperostotic sinusitis, prolonged intravenous antibiotic therapy should help in eradicating bone infection. A study to evaluate the role of prolonged ambulatory intravenous antibiotic therapy (6-8 weeks of culture directed antibiotic therapy) in chronic hyperostotic sinusitis is currently being undertaken at our institution.

CONCLUSION

Sinus hyperostosis is not an uncommon finding in chronic refractory sinusitis which may require long term intravenous antibiotic therapy in conjunction with surgery to provide symptomatic relief. Both the otolaryngologist and radiologist tend to overlook CT scan evidence of chronic hyperostotic sinusitis. A larger multicenter study is required to help formulate treatment protocols for patients with chronic hyperostotic rhinosinusitis.

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