

Prevalence of Onodi Cells in Hospital Raja Permaisuri Bainun, Ipoh, Malaysia

K L Tan* MD, S Harvinder* MBBS, Med, MBBS, MMED, (DRL-HNS)

*Department of ENT, Hospital Raja Permaisuri Bainun, Jalan Hospital, 30990 Ipoh, Perak, Malaysia

SUMMARY

Introduction: Onodi cell is a posterior ethmoid air cell that pneumatizes into the sphenoid sinus. It is an important entity for clinicians when performing endoscopic sinus surgery (EES) because it encroaches into the optic nerve and internal carotid artery. CT-scans are the road map for ESS to prevent damage to structures mentioned above. Its prevalence in Malaysia is unknown.

Method: 102 CT-scans of paranasal sinuses dated from 2006-2009 in Hospital Raja Permaisuri Bainun (HRPB), Ipoh, Malaysia were studied by Consultant Rhinologist (HS). The Onodi Cells were recorded as present on the left side, right side or bilaterally.

Results: A total of 59 males and 43 females with a mean age of 42 were studied. Twenty of the scans were noted to have Onodi cells. Of those with Onodi present, 5 were females and 15 were males; 9 of them had sinusitis and 11 had nasal polyposis. None of them were noted to have complications related to the Onodi cells. There were 6 with left side involvement, 7 with right side involvement and 7 with bilateral Onodi cells.

Conclusion: A prevalence of 19.6% was noted in the patients in HRPB, Ipoh, corresponding to other CT-scan studies ranging from 7-24%. The presence of Onodi cells should be routinely looked for by ESS surgeons to prevent damaging the optic nerve and internal carotid artery.

KEY WORDS:

Onodi cell, CT-scans, Prevalence, Hospital Raja Permaisuri Bainun, Ipoh, Malaysia

INTRODUCTION

Onodi cells are also known as the sphenothmoid cell. It is a posterior ethmoid air cell that pneumatizes superiorly and laterally into the sphenoid sinus. The onodi cells are precariously related to the internal carotid artery and the optic nerve, citing cases of sudden blindness caused by mucocoele of the onodi cell^{1,2}. There were also cases where optic nerve was injured during endoscopic sinus surgeries even if there is little encroachment of the onodi cells into the sphenoid sinus, leading to blindness post operatively³.

Much interest has been sparked recently on the prevalence

of onodi cells in the Malaysian population. It is not known at this moment, how prevalent are these in the Malaysian community. The presence of onodi cells could be investigated via the endoscopic method, gross anatomical dissection or using Computed Tomography (CT) scans³. The study of anatomical variation by CT-scans has become a reliable and non-invasive method in the diagnosis of anatomical variations of paranasal sinuses and the treatment of its complications. It also serves as a road map in surgical planning to prevent the aforementioned surgical complications. This study aims to describe the prevalence of onodi cells among the HRPB patients in Ipoh, Malaysia by studying the CT-scans of paranasal sinuses.

METHODS

102 CT-scans of paranasal sinuses of adults were studied. All the scans were done in Hospital Raja Permaisuri Bainun, Ipoh between 2006 and 2009. The scans were of patients who underwent Endoscopic Sinus Surgery (ESS) for mucosal diseases such as sinusitis, polyposis or inverted papilloma. Axial and coronal views were studied in the scans. Onodi cells were determined by the Consultant Rhinologist (HS) as absent, present in right side, left side or bilaterally. The prevalence between male, female and racial discrepancy were also analyzed.

RESULTS

CT-scans were dated from year 2006 until 2009. There were a total of 59 males and 43 females studied. The age ranges from 18-73 years old, with the mean age of 42. Patients studied included 46% Malay, 19% Chinese, 34% Indian and 1% orang asli.

Fifty-six of these patients had nasal polyposis, 45 of them had sinusitis and 1 had inverted papilloma.

Twenty patients, which is 19.6% of the scans were noted to have onodi cells. Of these patients, 5 were females and 15 were males, inferring a 1:3 ratio; 13 of them were Malays, 2 were Chinese and 4 were Indians; 9 of them had sinusitis and 11 had nasal polyposis. None of them were noted to have complications related to the onodi cells. The involvement of onodi cells were almost equally distributed with one third each having bilateral, right and left involvement respectively. (Figure 1)

This article was accepted: 27 June 2010

*Corresponding Author: Tan Keng Lu, M D Department of ENT, Hospital Raja Permaisuri Bainun, Jalan Hospital, 30990 Ipoh, Perak
Email: kenglu@yahoo.com*



Fig. 1: CT-scan demonstrating bilateral Onodi cells (white arrow). The sphenoid sinus, marked by the asterix (*), is pushed inferomedially. Note the horizontal septae in the sphenoid sinus bilaterally (black arrow).

DISCUSSION

This is a descriptive study of the prevalence of Onodi cells in the patients attending HRPB. It is the author's interest to investigate upon the prevalence of onodi cells, as this reminds how careful a surgeon should be while performing endoscopic sinus surgery. Recognition of onodi cells can prevent iatrogenic blindness or bleeding, and also to diagnose difficult cases of complications related to onodi cells.

There are numerous studies on the prevalence of Onodi cells around the world but none has described the prevalence in the Malaysian population. Previous studies have demonstrated a prevalence ranging from 7-60% worldwide using CT-scans and endoscopic methods^{3,4,7}.

Our study has noted a prevalence of 19.6% among the HRPB patients, with no sex, racial nor diagnosis preponderance. The prevalence in HRPB is noted to be corresponding within the range of other studies as shown in Table I, ranging from 7% to 24%^{6-9,11-14}. Studies in western hemisphere have consistently demonstrated prevalence ranging from 8-12%^{6-9,11,12}. Asian study by Aibara in Japan¹³ demonstrated a prevalence of 7%, lower compared to 19.6% in HRPB. The other Asian study by Yeoh and Tan in Singapore demonstrated a prevalence of 51%¹⁵, it was however a cadaveric endoscopic study. Our prevalence is equivalent to that of New Zealand Europeans and Polynesians which reported a prevalence of 24% and 11% respectively¹⁴. However, there is currently no study that demonstrated any factors or associations affecting the prevalence of Onodi cells.

The patients that were analyzed in our study all had nasal mucosal disease, which warranted a CT-paranasal sinus. Therefore the prevalence studied is among those with nasal mucosal disease. The paranasal CT-scans of an individual without nasal disease would not have been studied, as it would not have justified the exposure to radiation. It is, therefore, not known how prevalent Onodi cells are among the general population without nasal disease. This could be the reason of discrepancy noted in CT-scan studies compared to cadaveric endoscopic studies, which included those without nasal disease.

The discrepancy noted between studies using cadaveric endoscopic method and CT-scan studies is obvious, as

cadaveric studies have demonstrated prevalence ranging from 42-60%^{3,5,15}. However, studies based on CT-scans only showed a prevalence ranging from 7-24%^{6,7,8,9}. Studies utilising CT-scans has gained much popularity and approval despite the discrepancy seen, as CT-scan and its relevant role in pre-operative assessment is superior. It proved to be a valuable tool to clinicians in expecting the presence of onodi cell and thus preventing complications.

Table I: Comparison of studies of CT-demonstrated Onodi Cells

Study on CT scans	Prevalence of Onodi Cells in Percentage
Bas'ic ⁶ (Croatia)	10.4
Jones ⁷ (UK)	8
Perez-Pinas ⁸ (Spain)	11
Driben ⁹ (US)	7
Arslan ¹¹ (Turkey)	8
Weinberger ¹² (US)	12
Aibara ¹³ (Japan)	7
Polynesian ¹⁴ (NZ)	11
NZ European ¹⁴ (NZ)	24

CONCLUSION

The prevalence of onodi cells in HRPB, Ipoh, Malaysia correlates with the findings from other previous studies. The prevalence of 19.6% demonstrates that Onodi cells should be looked for in CT-scans of patients going for endoscopic nasal surgeries and certain ophthalmic complications related to Onodi cells. It remains a practical and relevant method to use CT-scans to determine the presence of Onodi cells in the management of patients.

REFERENCES

1. T. Klink. Acute visual loss by an Onodi cell. *Br J Ophthalmol* 2000;84:799.
2. Fujiyoshi Tatsuya, Yamamoto Hidenaga, Higuchi Satoshi *et al*. Primary Mucocoele of Ethmoid Sinus with the Onodi Cell. *Japanese Journal of Rhinology* 2002; Vol.41;No.4;Pg.335-340.
3. Thanaviratananich. The prevalence of an Onodi cell in adult Thai cadavers. *Ear, Nose & Throat Journal* 2003; vol. 82, no 3, pg. 200-204.
4. Dixon FW. A comparative study of the sphenoid sinus: A study of 1,600 skulls. *Ann Otol Rhinol Laryngol* 1937;46:687-698.
5. Kainz J, Stammberger H. Danger areas of the posterior rhinobasis. *Acta Otolaryngol* 1992;112:852-861.
6. Bas'ic N, Bas'ic V, Jukic T, *et al*. Computed tomographic imaging to determine the frequency of anatomical variations in pneumatization of the ethmoid bone. *Eur Arch Otorhinolaryngol* 1999;256:69-71.
7. Jones NS, Strobl A, Holland I. A study of the CT findings in 100 patients with rhinosinusitis and 100 controls. *Clin Otolaryngol* 1997; 22:47-51.
8. Perez-Pinas I, Sabate J, Carmona A *et al*. Anatomical variations in the human paranasal sinus region studied by CT. *J Anat* 2000;197:221-7.
9. Driben IS, Bolger WE, Robles HA *et al*. The reliability of computerized tomographic detection of the Onodi (sphenoethmoid) cell. *Am J Rhinol* 1998;12:105-11.
10. Nitinavakarn *et al*. Anatomical Variations of the Lateral Nasal Wall and Paranasal Sinuses: A CT Study for Endoscopic Sinus Surgery (ESS) in Thai Patients. *J Med Assoc Thai* 2005; 88(6): 763-8.
11. Arslan H, Aydinlioglu A, Bozkurt M, Egeli E. Anatomic variations of the paranasal sinuses: CT examination for endoscopic sinus surgery. *Auris Nasus Larynx* 1999;26:39-48.
12. Weinberger DG, Anand VK, Al-Rawi M *et al*. *Am I Rhinol Surgical anatomy and variations of the Onodi cell.* 1996;10:365-70.
13. Aibara R, Kawakita S, Yumoto E, Yanagihara N. Relationship of Onodi cell to optic neuritis-radiological anatomy on coronal CT scanning. *Nippon Iibiinkoka Gakkai Kaiho* 1997;100:663-70.
14. Allan Keast, Sofie Yelavich, Patrick Dawes, Brett Lyons. Anatomical variations of the paranasal sinuses in Polynesian and New Zealand European computerized tomography scans. *Otolaryngology-Head and Neck Surgery* (2008) 139, 216-221.
15. Yeoh KH, Tan KK. Surgical anatomy and variations of the Onodi cell. *Am J Rhinol* 1996; 10:365-70.