Evaluation of Rosenmuller Fossa with cone beam computed tomography: A retrospective radio-anatomical study

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ABSTRACT

Evaluation of Rosenmuller Fossa with cone beam computed tomography: a retrospective radio-anatomical study

Background: Rosenmuller fossa (RF) is known as a lateral pharyngeal recess, is bilaterally located beneath the skull base and behind the torus tubarius**.** Nasopharyngeal carcinoma is most commonly located in the RF. The purpose of this study is to evaluation of RF with cone beam computed tomography

Methods: A total of 150 subjects (80 females, 70 males, 6-88 years) were included in the study. Subjects were divided into age groups (6-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, over 60 years) and gender.

Result: There is no statistically significant difference between class (RF type) and gender ($p = 0.086$). There is a statistically significant association between the categories of age group and class variables ($p = 0.015$). RF type 1 was more common in the 6-20 age and 21-30 age groups, whereas RF type 3 was more common in the 41-50 age and 51-60 age groups.

Conclusion: When the literature was investigated, it was not found a study evaluating RF with cone beam computed tomography. When considering clinical significance, RF should be searched and examined in larger populations.

KEYWORDS

Cone beam computed tomography, Rosenmuller Fossa, Nasopharyngeal Carcinoma

ÖZ

Rosenmuller Fossa'nın konik ışınlı bilgisayarlı tomografi ile değerlendirilmesi: Retrospektif bir radyo-anatomik çalışma

Amaç: Rosenmuller fossa (RF) lateral faringeal girinti olarak bilinir, kafatasının altında ve torus tubarius'un arkasında bilateral olarak bulunur. Nazofaringeal karsinoma en sık Rosenmuller fossada gelişir. Bu çalışmanın amacı, Rosenmuller fossanın konik ışınlı bilgisayarlı tomografi ile değerlendirilmesidir.

Gereç ve Yöntemler: Çalışmaya toplam 150 denek (80 kadın, 70 erkek, 6-88 yıl) dahil edildi. Denekler 6-20 yaş, 21-30 yaş, 31-40 yaş, 41-50 yaş, 51-60 yaş ve 60 yaş üzeri olacak şekilde 6 yaş grubuna ve cinsiyete göre ayrıldı.

Bulgular: Rosenmuller fossa tiplerinin görülme sıklıkları değerlendirildiğinde farklı yaş gruplarında istatistiksel olarak anlamlı bir ilişki bulunmuştur ($p < 0.05$) veya ($p = 0.015$).6-20 yaş ve 21-30 yaş gruplarında RF tip 1 daha fazla görülürken, 41-50 yaş ve 51-60 yaş gruplarında RF tip 3 daha fazla görüldü.

Sonuç: Literatür incelendiğinde konik ışınlı bilgisayarlı tomografi ile Rosenmuller fossanın değerlendirildiği çalışma bulunamamıştır. Klinik önemi düşünüldüğünde Rosenmuller fossa daha geniş popülasyonlarda araştırılmalı ve incelenmelidir.

ANAHTAR KELİMELER

Konik ışınlı bilgisayarlı tomografi, Rosenmuller fossa, Nazofaringeal karsinoma

INTRODUCTION

The Rosenmuller Fossa (RF) anatomy was first described by Johann Christian Rosenmuller in 1808 and took its named after from his. This fossa, which is known as a lateral pharyngeal recess, is bilaterally located beneath the skull base and behind the torus tubarius.[1]

The recognition of RF is of clinical importance. Nasopharyngeal carcinoma is the most common malignant neoplasm of nasopharynx and is most commonly located in the RF. For the early detection of nasopharyngeal carcinomas, RF anatomy should be well known.[2] In addition, it has been reported that complications may occur secondary to

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the close relationship between the Eustachian tube and the internal carotid artery. This increases the clinical importance of the recognition of the RF.[3]

Cone beam computed tomography (CBCT) imaging is an accepted modality for radiographic evaluation of skull bony structures. The use of CBCT has many advantages such as high bone resolution, low radiation dose, ease of use and accessibility.[4] The purpose of this study is to evaluation of RF by CBCT.

MATERIAL AND METHODS

This retrospective study was performed on 150 subjects (80 females, 70 males, 6-88 years). The subject was randomly selected from the follow-up management system for radiographs. This retrospective study was conducted according to the principles of the Declaration of Helsinki. The subjects had no known syndromes, history of neurological diseases or surgical intervention in the region of the interest. Written informed consent was obtained from all patients/legal guardians prior to imaging with CBCT (Promax 3D Mid; Planmeca, Helsinki, Finland). Subjects were divided into age groups (6-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, over 60 years) and gender.

The shapes of the RF on CBCT images were classified into three types. Type 1; detectable shallow fossa (<5 mm depth), type 2; deep fossa (≥5 mm) with <1 mm wide openings, type 3; deep fossa (≥5 mm) with ≥1 mm wide openings (5) (Figure 1, Figure 2, Figure 3).

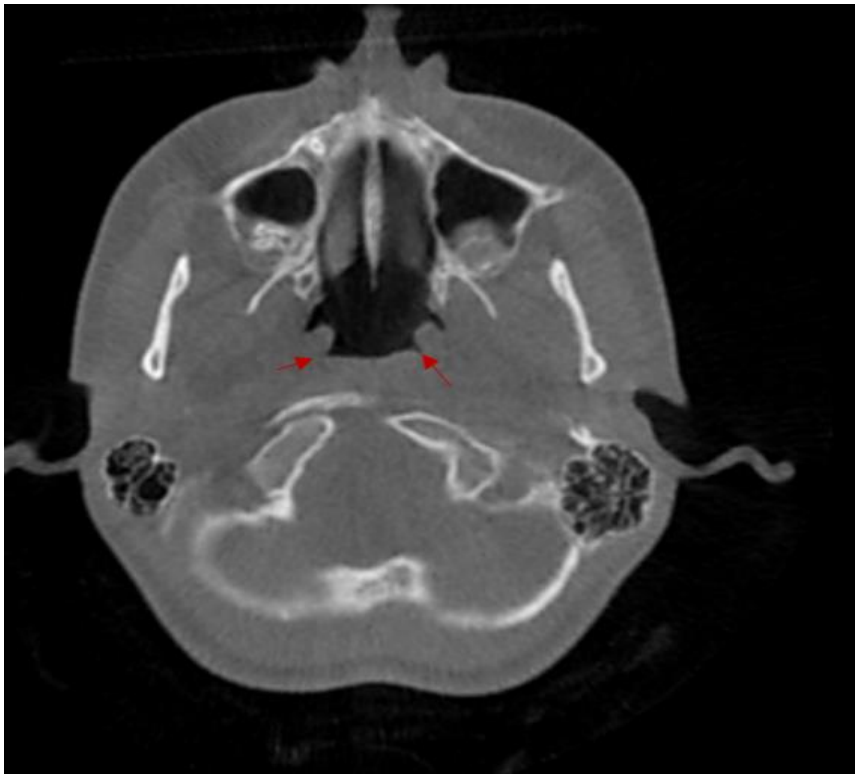

Figure 1. Appearance of RF Type 1 in CBCT (indicated by red arrows)

Figure 2. Appearance of RF Type 3 in CBCT (indicated by red arrows)

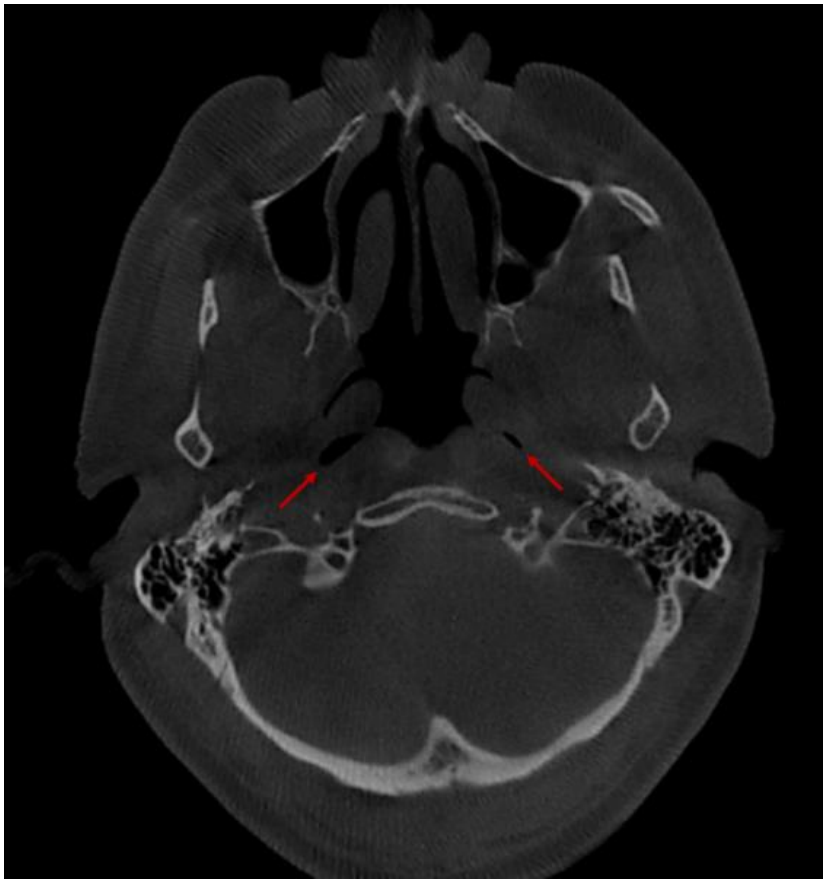

Figure 3. Appearance of RF Type 2 in CBCT (indicated by red arrows)

All statistical analyze was performed with Turcosa Cloud (Turcosa Ltd. Co, Turkey) statistical software. Descriptive statistic was performed. Shapiro-Wilk test was performed to check normality of the data. Pearson Chi-Square test was applied to evaluate any statistical significance between class variables and gender variables and also to evaluate any statistical significance between class variables and age group variables.

RESULTS

When the frequency of RF types in the examined total subjects was evaluated, RF type 1, 2, 3 were 61 (40.7 %), 30 (20 %), 59 (39.3 %) respectively. There is a statistically significant association between the categories of age group and class variables ($p = 0.015$) RF type 1 was more common in the 6-20 age (68 %) and 21-30 age groups 45.7 %), whereas RF type 3 was more common in the 41-50 age (59.1 %) and 51-60 age (61.5 %) groups. There is no statistically significant difference between class variables (*RF type*) and gender ($p = 0.086$). Statistical findings are summarized in the Table 1.

Table 1. Observation rates of Rosenmuller fossa types in age groups

AGE	6-20 age	21-30 age	31-40 age	41-50 age	51-60	60+ age	Total
RF Type 1	17/25 (68%)	16/35 (45.7%)	11/27 (40.7%)	7/22 (31.8%)	4/26 (15.4%)	6/15 (40.0%)	61/150 (40.7%)
RF Type 2	3/25 (12%)	8/35 (22.9%)	8/27 (29.6%)	2/22 (9.1%)	6/26 (23.1%)	3/15 (20.0%)	30/150 (20%)
RF Type 3	5/25 (20%)	11/35 (31.4%)	8/27 (29.6%)	13/22 (59.1%)	16/26 (61.5%)	6/15 (40.0%)	59/150 (39.3%)

DISCUSSION

There are many important anatomical structures in the skull. Computerized tomography (CT) and CBCT can be used to visualize these structures. However, a lower radiation dose is applied to the patient compared to CT in CBCT.[4]

Compere et al. investigated the relationship of the RF to secretory otitis media.[6] Loh et al. examined the anatomy of RF by CT and they found that there is little variation between the left and right RF. However, there is no information on the RF classification in their study.[7] Takasugi et al., observed RF on 97 patients CT images. In our study, we used the RF classification used by Takasugi et al. The researchers, differently from our results, reported that of the three types of RF, type 2 was dominant.[5]

Peters et al. Reported a case of RF cyst and RF imaging with CT and magnetic resonance (MR).[8] Shilston et al. Presented a case of rhinolith found in the RF observed with CT.[9] As can be seen from these cases, RF is important in terms of pathologies. RF spreads through a flaw among the base of the skull and fibers of the superior constrictor muscle.[1] In the literature, there are studies that examined RF in the literature with CT and MR imaging. However, there is no study on RF with CBCT.

CONCLUSION

It is a very important anatomical study when RF is the most common location of nasopharyngeal carcinoma and the surgical importance of secondary complication risk. This structure needs to be studied in larger populations.

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