

Mini Review Article

The Tubarial Glands: Discovered But Not Defined – A Narrative Review

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ABSTRACT

A pair of salivary glands, named as tubarial glands, was found between the nasal cavity and throat, i.e., at the nasopharynx's lateral walls, overlaying the torus tubarius by the Netherlands Cancer Institute while working on radiation toxicity among prostate cancer patients. The tubarial glands were identified using prostate-specific membrane antigen imaging using positron emission tomography coupled with computed tomography, which is used to detect the spread of prostate cancer. The anatomy, physiology, oncological study of the glands, and data's interpretation and limitations from the research to date have been discussed.

KEYWORDS: Prostate-specific membrane antigen imaging using positron emission tomography coupled with computed tomography, radiation toxicity, radiotherapy, salivary glands, tubarial glands

INTRODUCTION

The tubarial salivary glands brought to human knowledge by the Netherlands Cancer Institute (NCI) are more than another anatomical structure to study; their presence may have implications in various fields, with oncology and radiation taking the limelight for now. The reason for this is that during radiation therapy for head-and-neck cancers, major salivary glands are considered organs at risk and hence necessitate precaution; the location of these new glands in the posterior nasopharynx, an area not spared during therapy, brings about the possibilities of explaining and avoiding side effects of radiation.^[1]

DISCOVERY

These glands have been identified in the NCI with the help of positron emission tomography/computed tomography with a radiolabeled tracer to the prostate-specific membrane antigen (PET/CT-PSMA), an imaging technique which, though is typically used to detect prostate cancer, has also been proven to provide highly specific and sensitive visualization of the salivary glands.^[1,2]

ANATOMICAL STUDY AND INTERPRETATION

On discovery of this previously unknown structure on PET/CT-PSMA, the research team further evaluated 100 patients with the imaging technique. All of them showed a demarcated PSMA-positive area extending

from the skull base, downward along the posterolateral pharyngeal wall, on the pharyngeal side of the superior pharyngeal constrictor muscle; a poorly accessible location, which may have played a role in its lack of identification.^[1] The primary factor is that though conventional imaging may have identified the structure, its interpretation as a salivary gland was not possible until the PSMA-PET/CT.

Cadaveric studies coupled with the imaging study have come to let us know that the tubarial salivary glands are bilateral macroscopic glands in the posterior nasopharynx, averaging at a length of 4 cm, draping over the torus tubarius and hence gaining their name. They extend from the pharyngeal wall caudally to the Rosenmüller fossa cranially. They are equipped with multiple macroscopic ducts that open into the dorsolateral pharyngeal wall.

Histological studies showed that the glandular tissue to be predominantly of the mucous acini, with very few serous acini, proved further by the absence of amylase expression in the gland cells. This paves the way for the thought that the function of these glands lied in moistening and lubricating the posterior nasopharynx.

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STUDY ON RADIATION TOXICITY AND INTERPRETATION

If, in fact, the function of these glands lied as above discussed, it posed an opportunity for toxicity following radiation for head-and-neck cancers (xerostomia and/or dysphagia), as they are present in an area not usually spared from high doses. The research institute in the Netherlands aiming to look into this effect evaluated 723 patients in whom high radiation in the area of the new glands was seen to be associated at all times with xerostomia and dysphagia of a grade ≥ 2 . Even after subsequent patient presentation with toxicity and required correction of radiation dosage around the previously considered organs at risk, xerostomia, either moderate or severe, was still present, albeit reduced.^[1]

Limitations

A well-met debate exists on the exact nature of the salivary gland: is it to be considered a major gland, a group of minor glands, a separate organ, or as stated by the research institute; none of the above, and simply a “macroscopic part of the composite salivary gland organ system?” Statements such as their stark similarity to the sublingual glands, their lack of capsule, or them fitting into the textbook definition of an organ, have been made backing the categories of classification above respectively, making it quite an indecisive question to answer.

Another point to be noted is that out of the 100 patients who underwent imaging, 99 were males; hence, at the end of the day, the lack of equal representation leaves the data inadequate. On a similar hand, though, through the conferred anatomical, histological, and radiation toxicity-related data, one can rightfully be assumed that the physiological function of the tubarial glands is in moistening and lubricating the nasopharynx and oropharynx, similar to the other salivary glands, there is no adequate research specifically backing the claim.

It is also worth mentioning a limitation of the research lies in the fact that the toxicity of radiation can also be due to other organs at risk, especially the parotid gland and minor palatal glands. This needs to be evaluated further through prospective studies, as though there is no doubt in the opportunity that the sparing of these glands provides in reducing side effects, we do not know how fruitful it may actually be, nor do we know how much of the gland and how to best spare it for required positive outcomes.

CONCLUSION

We had encountered these glands at a time when we thought we knew almost all that there is to know about the human body, hence proving the words of Socrates, who said, “The only true wisdom is in knowing you know nothing.” Yet, our quench for knowledge remains as many unanswered questions prevail; whether it be on their role in radiation and oncology, in the pathologies that may now find an answer, or even in the basic physiology and anatomy of the pharynx and salivary glands. After all, the tubarial glands have only been discovered, they are yet to be conquered.

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Conflict of interest

There are no conflicts of interest.

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