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# Navigation-guided biopsy of retropharyngeal lymph nodes

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## SUMMARY

The impact of metastasis to the retropharyngeal lymph node group is poorly understood because of the difficult access to the retropharyngeal space (RPS). In 20%–50% of surgically treated oropharyngeal, hypopharyngeal, and cervical oesophageal carcinomas, we can find metastases to the retropharyngeal lymph nodes (RPLNs).<sup>1</sup> The use of a three-dimensional (3D)-imaging-guided navigation system to perform a biopsy for a suspicion of metastasis in an RPLN can provide advantages in terms of better precision and 3D orientation with protection of the surrounding critical structures. We report two cases of an open biopsy by transoral and transnasal approaches for a suspicion of metastasis in a retropharyngeal lymph node in two patients with oropharyngeal and pulmonary cancer, respectively, by using the 3D imaging-guided navigation system. In the both cases, the biopsies performed were very accurate and allowed to get a full histological analysis and diagnosis. The use of the navigation system as a means to perform biopsies in the soft tissue of the neck is rarely reported and up to date few reports can be found in the literature. This technique can provide multiple advantages when compared with other conventional methods. The procedure is simple, safe and minimally invasive.

## BACKGROUND

The radiological-guided transcutaneous biopsy of a retropharyngeal lymph node in head and neck cancers is generally very difficult due to a lack of precise orientation and the risk of damage to the critical nerves and vessels.

Performing an open biopsy in the retropharyngeal space (RPS) via a transcervical approach after a neck dissection or radiotherapy is usually problematic with a high risk of complications.

The use of a three-dimensional (3D)-imaging-guided navigation system to access the RPS can provide multiple advantages when compared with the other methods. We reported our experience regarding two clinical cases in using the navigation system to access the RPS.

## CASE PRESENTATION

### The first case

A 62-year-old man, active smoker was diagnosed with a left-sided oropharyngeal squamous cell carcinoma, initially staged as cT4a cN2c cM0 and underwent curative radiochemotherapy (70 Gy over 30 doses combined with weekly cisplatin). Follow-up by CT scan (figure 1A) at 6 months

showed a submucosal necrotic mass of 1.8 cm in the RPS on the left side, suspect of a local recurrence, in contact with the internal carotid artery. The transcervical open approach or the radiological-guided transcutaneous biopsy was not possible to be performed because of the deep localisation of the masse in the RFS, the contact with the internal carotid artery and the important fibrosis related to the previous radiotherapy. A biopsy using a 3D-imaging-guided navigation system (Fusion ENT Navigation, Medtronic, Switzerland) was performed by transoral approach with a rigid endoscope of 0° (Karl Storz Endoscopy, Germany) (figure 1B). *A high precision and very accurate 3D-anatomical orientation were obtained intraoperatively by using the navigation system, allowed to better localise the suspect lesion in the deep part of the RFS on the left side and to perform a direct biopsy without any accidental injury to the critical surrounding structures (figure 1C).* Neither preoperative nor postoperative complications were observed. The histological analysis confirmed the diagnosis of metastasis of a squamous cell carcinoma. The patient received a palliative chemotherapy with carboplatin and erbitux.

### The second case

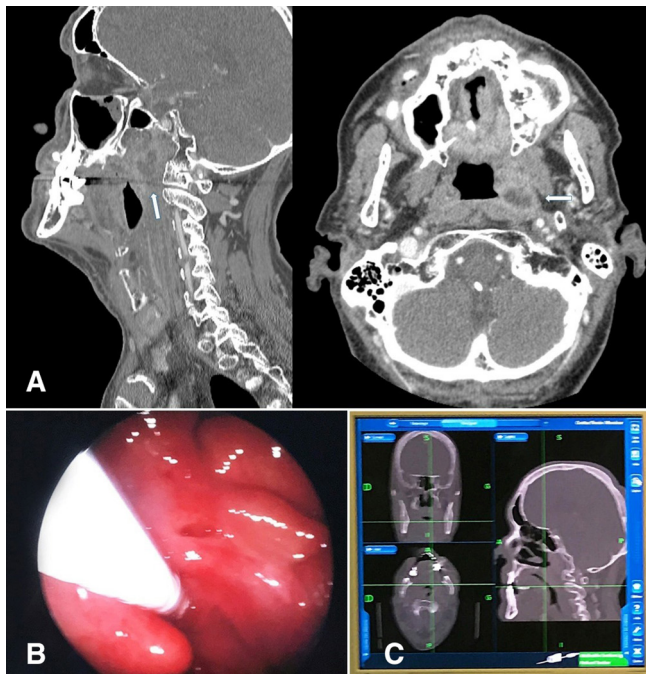
A 71-year-old man, smoker was diagnosed with a pulmonary adenocarcinoma of the left inferior lobe, staged as cT2a cN0 cM0.

A CT scan and positron emission tomography (PET)-CT (figure 2A) showed a suspicious and hypermetabolic left-sided retropharyngeal mass, at the level of the nasopharynx. The clinical examination with the fibroendoscopy showed an asymmetric left-posterolateral rhinopharyngeal wall without any exophytic or ulcerative lesion. The possibility of a rare metastasis of the pulmonary carcinoma to the retropharyngeal space or another synchronic tumour was suggested. The biopsy of the suspicious mass by using the transcervical or transcutaneous approaches was not possible because of the deep localisation of the mass, the difficulties to access the RFS at this level and the presence of a critical nerves and major vessels, especially the approximately with the internal carotid artery. The use of a 3D-imaging-guided navigation system to perform a biopsy of the suspicious mass in the RFS by a transnasal approach was very useful in terms of getting an intraoperatively 3D-anatomical orientation, very accurate localisation of the mass and a high protection of the critical surrounding structure (figure 2B), the biopsy was done with a complete safety without any complications. The histological



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**Figure 1** (A) Axial and sagittal CT scan views showing the suspicious necrotic and poorly defined mass in the retropharyngeal space (RFS) on the left side. (B) Endoscopic view shows the localisation of the mass and the performing of the biopsy. (C) The three-dimensional anatomical and accurate localisation of the mass in the RFS on the left side with the navigation system.

analysis showed an atypical lymphocytic hyperplasia without signs of malignancy. The patient was treated for his pulmonary carcinoma by primary surgery followed by adjuvant chemotherapy.

## OUTCOME AND FOLLOW-UP

### The first case

The follow-up 6 months after the palliative chemotherapy showed no local progression of the disease or appearance of a distant metastasis. No complications related to the surgical procedure were observed.

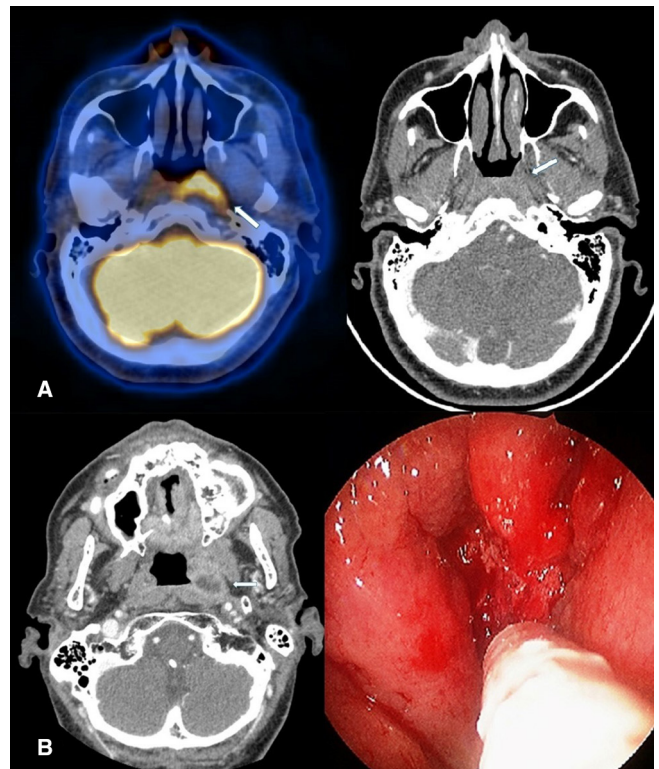
### The second case

The follow-up 6 months after the treatment of the pulmonary cancer showed no signs of local or regional recurrence or appearance of a distant metastasis.

## DISCUSSION

The access to the RPS is difficult due to the deep localisation in the neck with the presence of critical vessels and nerves. Surgical approaches to the RFS are classified as transcervical or transoral.<sup>2</sup> The transcervical approach entails various complications.<sup>3</sup> The transoral approach has recently been reported as minimally invasive and providing easy access to the RFS. However, the conventional transoral approach has certain disadvantages, such as an inadequate surgical field and view as well as disturbance of the surgeon's depth perception.<sup>3</sup>

By using assistive modalities including ultrasonography, cone beam CT and robotic systems, the transoral approach can be used to access the RPS. The navigation system is useful for ensuring precise surgical orientation. The RPS is an



**Figure 2** (A) Axial CT scan and positron emission tomography-CT fusion images showing a poorly defined and hypermetabolic mass in the retropharyngeal space, on the left side, at the level of the nasopharynx. (B) The accurate anatomical localisation of the mass by using the navigation system, combined with the transnasal endoscopic approach.

appropriate area for the use of a navigation system because it is less susceptible to mobility caused by neck extension than other laryngopharyngeal regions.<sup>3</sup> The transoral approach is limited by the degree of mouth opening and dental anatomy. For this reason, its main indication is a lesion that is located below the level of the hard palate and the pterygoid hamulus.<sup>3</sup> In our first case presented above, the retropharyngeal lymph node (RPLN) was located below this level and was accessed by transoral approach. In the second case presented above, the location of the RPLN was above this level and was accessed by transnasal approach. The combination of MRI and CT with navigation-guided surgery provides a better targeting and more intraoperative control to the location of the possibly malignant lesions.<sup>4</sup>

We only found a few reports in the literature regarding the use of an imaging-guided navigation system in the surgical access to the RPS. Mierzwa *et al* reported a case of surgical

## Learning points

- ▶ The use of a three-dimensional imaging-guided navigation system to perform a biopsy for a suspicious lymph node in the retropharyngeal space might be a helpful technique and can provide multiple advantages when compared with other conventional methods.
- ▶ Both transoral and transnasal approaches can be performed with the imaging-guided navigation system.
- ▶ The procedure is simple, safe, quick and minimally invasive.

resection of an RPLN metastasis of a tonsil carcinoma<sup>3</sup> and Tanaka *et al* reported a case of excision of an RPLN metastasis of the tongue.<sup>1</sup>

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