CASE REPORT

Role of narrow band imaging in the diagnostics of sinonasal pathology

Kristian Bruun Petersen, Thomas Kjaergaard

Department of ENT, Aarhus University Hospital, Aarhus C, Denmark

Correspondence to
Dr Kristian Bruun Petersen,
kristianbp@gmail.com

Accepted 28 February 2017

SUMMARY

Malignancies of the nasal cavity and paranasal sinuses are well known, but have uncommon presentations. Late diagnosis and local extension are significant prognostic factors associated with a poorer treatment outcome. Thus, refinements of the diagnostic procedures to enhance the sensitivity of the clinical evaluation are desirable. We here describe a case of endonasal lymphoma, in which the lesion was hardly visible and initially ignored at ordinary white light (WLI) nasoendoscopy, but easily recognisable, clearly pathogenic and well demarcated when illuminated with narrow band imaging (NBI) at a later session. In general, with regard to mucosal-derived pathology of the upper aerodigestive tract, the diagnostic gain of NBI-assisted endoscopy in comparison with that of WLI has been proved in several articles. The focus has however been on neoplasm in laryngopharynx and oesophagus. The authors recommend broadening the use of NBI to include all evaluations of nasal mucosa, when malignancy is suspected.

BACKGROUND

Lymphomas of the nasal cavity and paranasal sinuses are uncommon presentations. The symptoms may initially be sparse, and because of the narrow anatomy a proper view of the mucosa can be difficult to attain. Regarding these specific pathologies, malignant transformation is a significant prognostic factor associated with a poorer treatment outcome. Thus, refinements of the diagnostic procedures to enhance the sensitivity of the nasoendoscopic evaluation and to choose a representative site for biopsy are desirable.

We here describe a case of endonasal lymphoma, in which the lesion was hardly visible and initially ignored at white light (WLI) nasoendoscopy but easily recognisable, clearly pathogenic and well demarcated when illuminated with use of narrow band imaging (NBI) at a later session.

CASE PRESENTATION

The case presents a 69-year-old man referred for ear, nose and throat (ENT) evaluation due to suspected transformation of non-Hodgkin's follicular lymphoma (NHL) in the cervical and mediastinal lymph nodes and in the nasal cavity.

The patient was initially diagnosed in 2010 with Ann-Arbor grade 1, stadium 4A follicular lymphoma confined to the lymph nodes of the anterior neck, the underarms and the inguinal fossae. The disease did not at that time require any treatment.

However, in 2013, the involvement included the floor of the left maxillary sinus as well as several nodal and extranodal foci in the head and neck, retroperitoneum and the mediastinum. Biopsies revealed transformation high to intermediate risk diffuse B-cell lymphoma. Primary symptoms at that time were left-sided facial pain, localised swelling of the midface and anterior nasal secretion, but he did not report any B symptoms and did not present elevated levels of lactate dehydrogenase (LDH). Owing to the histopathological findings he was advised to chemoimmunotherapy.ⁱ

INVESTIGATIONS

The patient remained free of disease until a routine follow-up at 13 months where positron emission tomography (PET)-CT revealed pathological fluorodeoxyglucose (FDG) uptake in lymph nodes in the neck and the superior mediastinum. Even though he at that time did not complain of any nasal symptoms, increased FDG uptake was noted in the left nasal cavity ([figure 1](#)), and he was referred for ENT evaluation and cervical lymphadenectomy. Preoperatively WLI fibre optic endoscopy of the nasal cavities was performed but did not identify any suspicious lesions and thus no clinical correlation to the PET-CT findings. During the scheduled procedure under general anaesthesia, the endoscopy was repeated ([video 1](#)), this time applying NBI. The first pass with WLI did not reveal any obvious pathology. However, using a 30° rigid endoscope (Olympus) and applying NBI, a pathological area was clearly visible as an altered, demarcated light-brownish site presenting vessels of type 2 and 3 atypism.

DIFFERENTIAL DIAGNOSIS

A significant number of medical disorders may give rise to generalised or local lymph node enlargement.

Some of the conditions in which the clinical manifestations can mimic those of non-Hodgkin's lymphoma are:

- Metastatic solid tumour malignancies,
- Reactive follicular hyperplasia,

^[i]The therapy regimen was a combination of high-dose methotrexate and cyclophosphamide, doxorubicin, vincristine, and prednisone, plus the monoclonal antibody rituximab (R-CHOP). R-CHOP is an acronym for the generally used first-line therapy in most cases of non-Hodgkin's lymphoma. The treatment includes the monoclonal antibody rituximab and several chemotherapeutic agents. Typically, courses are administered at regular intervals of 2 or 3 weeks.

CrossMark

To cite: Petersen KB, Kjaergaard T. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-218175

Figure 1 PET CT scan. A PET-CT scan at a routine follow-up 13 months after the time of the initial diagnosis revealed pathological FDG uptake in lymph nodes in the neck and the superior mediastinum. Increased FDG uptake was noted in the left nasal cavity, but the patient did not at that time present any nasal symptoms. FDG, fluorodeoxyglucose; PET, positron emission tomography.

- ▶ Hodgkin's lymphoma,
- ▶ Other haematological malignancies.

OUTCOME AND FOLLOW-UP

Biopsies from the demarcated area in the mucosa of the left nasal floor and the ipsilateral lymph nodes showed follicular lymphoma grade 2, and the patient was advised to sustained treatment.ⁱⁱ A close follow-up regimen was planned, and the patient has as of now not shown any signs of malignant relapse. Owing to intermittent episodes of high fever, shallow breath and productive cough, he has received consecutive medical treatments for suspected pneumonia including broad-spectrum antibiotics and immunoglobulin during the latter 12 months.

DISCUSSION

The case presents a suspected transformation of NHL in the nasal floor. Extranodal involvement is fairly common in such regards and is seen in more than 60% of all NHLs in the head and neck region, the typical extranodal sites being the paranasal sinuses, the nasal or oral cavity, the salivary glands and laryngopharynx.^{1 2} Malignant transformation worsens the median survival and may raise the probability of elevated levels of LDH and the presence of B symptoms.

The main symptoms of the displayed patient were rhinorrhoea, pain and soreness. Lymphomas of the nasal cavity may further present with crusts, epistaxis, facial swelling or congestion.³ Since the signs of transformation are non-specific, the diagnosis is based on histopathological assessment of tissue biopsies, but the probability of malignancy might be assessed with PET-CT scans. The gross appearance of lymphomas in the aerodigestive tract is usually described as submucosal infiltrative masses that clearly differ from the papillomatous and well-defined tumours of squamous cell carcinomas (SCCs). As in this case, the macroscopic manifestations when visualised under

Video 1 Sinonasal lymphoma. By use of narrow band imaging, the lesion is clearly visible as a demarcated light-brownish site presenting winding, tortuous vessels of type 2 and 3 atypism. The video shows the difference compared with ordinary, white light.

WLI might however be sparse. A thorough and sensitive evaluation of the site of biopsy is therefore important raising a need for means to enhance the quality of the objective evaluation. The scope of this case report is to describe such an advanced visualising modality and to show the effect when applied.

NBI (Olympus Medical System Corporation) is an endoscopic technique, in which filtered light is used to amplify mucosal malignancies by cause of their inherent neoangionic pattern.^{4 5} Owing to changes in the intraepithelial papillary capillary loop mosaic, the modality has been found useful for the qualitative differentiation of suspected cancerous versus non-cancerous lesions and determination of the degree of infiltration of tumours in aerodigestive mucosal sites.⁴⁻⁶

The role of NBI has through various case reports been widened to include evaluation of gastric mucosa-associated lymphoid tissue (MALT) lymphoma. The sparse reports of these cases describe the appearance of abnormal blood vessels resembling branches from the trunk of a tree.⁷ Different authors conclude that the use of NBI made identification of the aberrant microvascular patterns easier and state that the modality might be useful in the diagnosis and evaluation of gastrointestinal lymphomas.^{8 9}

But the technique has had its most pronounced impact in the diagnostic work up, staging and follow-up of SCC's and adenocarcinomas of the aerodigestive tract. In a multicentre, randomised controlled trial (RCT) including 320 patients with oesophageal SCC, the patients were randomly assigned in order to compare the diagnostic yield between conventional WLI and NBI. In the study NBI detected superficial cancer more frequently than did WLI in the head and neck region and in the oesophagus (100% vs 8%, $p < 0.001$; 97% vs 55%, $p < 0.001$, respectively). The overall accuracy and sensitivity for the diagnosis of malignancy were furthermore significantly higher when using NBI.⁴ The results have been confirmed by later reports. Piazza and colleagues described a RCT including 444 patients affected by upper aerodigestive tract SCC. The diagnostic gain using NBI and high-definition television was significant in all subregions, most pronounced in the oral cavity and oropharynx (25%).¹⁰ The RCTs in this regard are however sparse and meta-analyses focusing on the diagnostic yield of NBI in comparison with that of WLI have yet to be performed.

The modality has been used for years to identify and differentiate between dysplasia and adenocarcinoma related to the gastro-oesophageal junction. Several studies have shown

ⁱⁱThe sustained immunotherapy consisted of rituximab and privena, a preparation of IgG used as replacement therapy in cases of hypogammaglobulinaemia and primary immunodeficiency diseases.

excellent interobserver and intraobserver agreement for mucosal and vascular patterns as well as in prediction of dysplastic histology.^{11 12} A recent systematic review and meta-analysis including 33 studies concluded that for the optical diagnosis (4 studies; pooled estimate (PE) 0.85, 95% CI 0.75 to 0.91) and estimate of presence of deep invasion (13 studies; PE 0.77, 95% CI 0.68 to 0.84) of T1 colorectal cancer, the use of NBI yielded significantly higher sensitivity compared with the interpretation of gross morphological features, that is the case of WLI.¹³

Regarding the examination of the nasal cavity and paranasal sinuses only two other studies describe the appliance of NBI:

Pagella *et al*¹⁴ focused on the use of NBI in the description of a case of nasal haemorrhagic telangiectasia in which the NBI-assisted endoscopy permitted a better definition of the morphological aspects of the lesions.

Torretta and colleagues reported on a left nasopharyngeal mass that had been unsuccessfully biopsied and assessed by means of traditional WLI endoscopic technique. In conclusion, the article praises the usefulness of NBI endoscopy in diagnosing vascularised nasal lesions and in guiding the therapeutic approach.¹⁵

Sinonasal disease is one of the most common clinical head and neck pathologies. The majority of sinonasal pathology is inflammatory with neoplasms only comprising ~3% of all head and neck tumours. Although malignancies in the nose and paranasal sinuses are rare, they are often diagnosed at an advanced stage worsening the prognosis.¹⁶ Thus, refinements of the diagnostic procedures to enhance the accuracy of the nasoendoscopic evaluation are desired. In case of the most frequent malignancies of the upper aerodigestive tract, the diagnostic gain of NBI has been

stated in several articles. Yet regarding neoplasms of the nose and paranasal sinuses as in the presented case of suspected transformation of nasal lymphoma, NBI is only sparsely acknowledged, and it is the authors' opinion, that the role of this technique is not yet fully developed in these sites.

After reviewing the literature, the authors recommend the use of NBI broadened to include all evaluations of nasal mucosa, when malignancy and in particular if adenocarcinoma (level of evidence (LoE) 1a), SCC (LoE 1b) or lymphoma (LoE 4) is suspected.

Bearing in mind that the technique has never been validated for this specific anatomical region, the authors recommend further studies in this regard.

Contributors KBP is the guarantor and was involved in literature search and writing of the article. TK contributed to the original idea and identification of case.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Rudders RA, Ross ME, Delellis RA. Primary extranodal lymphoma response to treatment and factors influencing prognosis. *Cancer* 1978;42:406–16.
- 2 Brugère, Schlienger M, Gérard-Marchant R, *et al*. Non-Hodgkin's malignant lymphomata of upper digestive and respiratory tract: natural history and results of radiotherapy. *Br J Cancer Suppl* 1975;2:435–40.
- 3 Quraishi MS, Bessell EM, Clark D, *et al*. Non-Hodgkin's lymphoma of the sinonasal tract. *Laryngoscope* 2000;110:1489–92.
- 4 Muto M, Minashi K, Yano T, *et al*. Early detection of superficial squamous cell carcinoma in the head and neck region and esophagus by narrow band imaging: a multicenter randomized controlled trial. *J Clin Oncol* 2010;28:1566–72.
- 5 Muto M, Katada C, Sano Y, *et al*. Narrow band imaging: a new diagnostic approach to visualize angiogenesis in superficial neoplasia. *Clin Gastroenterol Hepatol* 2005;3(Suppl 1):S16–20.
- 6 Inoue H. [Endoscopic diagnosis of tissue atypism (EA) in the pharyngeal and esophageal squamous epithelium; IPCL pattern classification and ECA classification]. *Kyobu Geka* 2007;60(Suppl 1):768–75.
- 7 Norimura D, Isomoto H, Imaizumi Y, *et al*. Case series of duodenal follicular lymphoma, observed by magnified endoscopy with narrow-band imaging. *Gastrointest Endosc* 2011;74:428–34.
- 8 Nonaka K, Ohata K, Matsuhashi N, *et al*. Is narrow-band imaging useful for histological evaluation of gastric mucosa-associated lymphoid tissue lymphoma after treatment? *Dig Endosc* 2014;26:358–64.
- 9 Fujiya M, Kashima S, Ikuta K, *et al*. Decreased numbers of vascular networks and irregular vessels on narrow-band imaging are useful findings for distinguishing intestinal lymphoma from lymphoid hyperplasia. *Gastrointest Endosc* 2014;80:1064–71.
- 10 Piazza C, Cocco D, Del Bon F, *et al*. Narrow band imaging and high definition television in the endoscopic evaluation of upper aero-digestive tract cancer. *Acta Otorhinolaryngol Ital* 2011;31:70–5.
- 11 Kato M, Goda K, Shimizu Y, *et al*. Image assessment of Barrett's esophagus using the simplified narrow band imaging classification. *J Gastroenterol* 2016 Jul 22 (Epub ahead of print).
- 12 Sharma P, Bergman JJ, Goda K, *et al*. Development and validation of a classification system to identify high-grade dysplasia and esophageal adenocarcinoma in Barrett's esophagus using narrow-band imaging. *Gastroenterology* 2016;150:591–8.
- 13 Backes Y, Moss A, Reitsma JB, *et al*. Narrow band imaging, magnifying chromoendoscopy, and gross morphological features for the optical diagnosis of T1 colorectal cancer and deep submucosal invasion: a systematic review and meta-analysis. *Am J Gastroenterol* 2016;112:54–64.
- 14 Pagella F, Pusateri A, Chu F, *et al*. Narrow-band imaging in the endoscopic evaluation of hereditary hemorrhagic telangiectasia patients. *Laryngoscope* 2013;123:2967–8.
- 15 Torretta S, Gaffuri M, Cantarella G, *et al*. Narrow-band imaging in the diagnosis of vascular nasal lesions. *Am J Otolaryngol* 2013;34:75–8.
- 16 Das S, Kirsch CFE. Imaging of lumps and bumps in the nose: a review of sinonasal tumours. *Cancer Imaging* 2005;5:167–77.

Learning points

- Narrow band imaging (NBI, Olympus Medical System Corporation) is an endoscopic technique, in which filtered light is used to amplify mucosal malignancies in view of the inherent neoangiogenesis. The modality has been validated for a broad spectrum of mucosa-associated neoplasms including adenocarcinomas (level of evidence (LoE) 1a), squamous cell carcinomas (LoE 1b) and mucosa-associated lymphoid tissue lymphomas (LoE 4).
- The presented case exemplifies the diagnostic gain of NBI and discusses the present status of appliance. It is a fairly new technique that has yet to find its feet in the diagnosis and treatment of neoplasms in the upper aerodigestive tract. The procedure is easily implementable and has been proved to raise the sensitivity and positive predictive value of endoscopic procedures significantly if applied routinely, also in areas where malignancy is rare.
- Owing to the complex anatomy of the nose and paranasal sinuses, diagnostic procedures to enhance the sensitivity of the endoscopic evaluation are especially desired. The authors recommend the use of NBI broadened to include all evaluations of nasal mucosa when malignancy is suspected; yet state that further studies are needed in order to validate the use in this specific region.

Copyright 2017 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow