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Removal of Submucosal Foreign Body of the Hypopharynx Using Image Intensifier : A Case Report

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The use of an image intensifier is well established in orthopedics, trauma, urology, general surgery and intraarterial angiography, but is an unfamiliar tool for otolaryngologists. This is a case report of a 72 year-old female patient, who swallowed a metal wire. The wire was embedded in the submucosal tissue of the hypopharynx, and could not be found with an endoscope, although it was visualized by soft tissue X-ray and computed tomography, and was removed successfully using an image intensifier. Foreign body impaction in the pharynx is a common case for ENT emergency. Foreign bodies, especially fish bones, are usually impacted into the oropharynx, and are easily found and removed. The case of deep impaction of foreign body into the submucosa of pharynx is very rare, and the removal of foreign body is difficult in such a case. An image intensifier may be a useful tool to remove submucosal foreign body.

Key words: submucosal foreign body, extrapharyngeal foreign body, direct laryngoscopy, image intensifier

INTRODUCTION

The use of an image intensifier is well established. It is used for reposition of fracture in orthopedics, ERCP（endoscopic retrograde cholangiopancreatography）or insertion of ileus tube in gastroenterology, ESWL（extracorporeal shock wave lithotripsy）in urology, angiography and intravascular surgery in circulatory and neurosurgery. But it is an unfamiliar tool for otolaryngologists.

Otorhinolaryngologists often encounter patients with many kinds of foreign bodies embedded in the pharynx, which are considered to be common ear, nose and throat（ENT）emergency cases［1, 2］. In the case with impacted fish bones into the oropharyngeal mucosa, which are common case, fish bones are easily found and removed under local anesthesia at an out-patient clinic. Although, in some cases, foreign bodies move downwards, and become impacted into the hypopharyngeal wall, these can be easily found with an endoscopic examination and removed under local or general anesthesia. However, scarcely, a foreign body is embedded in a deep portion of submucosal tissue in the pharynx, and can be very difficult to find and remove.

Herein we describe details of a rare case of a submucosal foreign body in the hypopharynx which was not found with an endoscopic examination, but was found by soft tissue X-ray of the neck and a computed tomography（CT）scan. The position of foreign body was clarified using an image intensifier and removed successfully under general anesthesia without any complications.

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CASE REPORT

A 72-year-old female patient was aware of a

throat pain after eating a simmered dish of fish and eggplants. Two days later, she visited a local general hospital because of progressive swallowing pain. Only a slight redness in hypopharyngeal mucosa was pointed out following an endoscopic examination, but a foreign body was identified in the hypopharyngeal sub-mucosal tissue by soft tissue X-ray of the neck and a CT scan at that hospital. On the next day, she was referred to our hospital for the purpose of removing the foreign body, and was thus admitted to our hospital on the same day for further examination and surgical intervention.

Physical examination and image finding:

Although only slight redness and swelling of the mucosa at the left piriform fossa of the hypopharynx was pointed out in the endoscopy（Fig. 1-A, B）, the foreign body was identified in the submu-

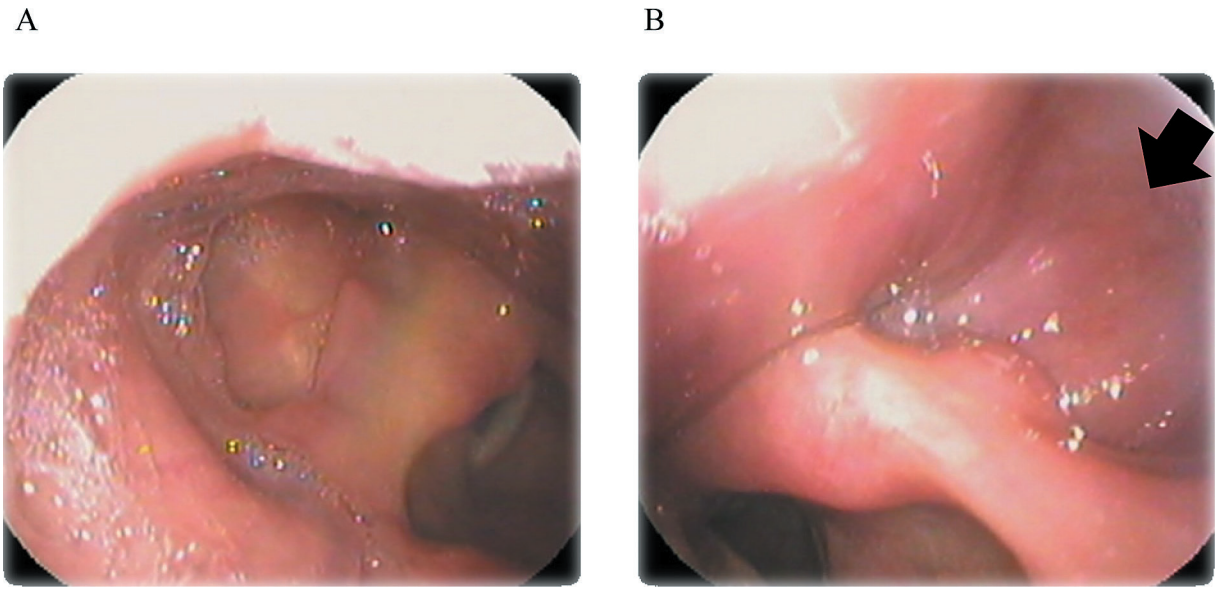

Fig. 1. Local findings of hypopharynx observed by endoscope. Although right piriform fossa was normal（A）, slight redness and swelling（arrow）of left piriform fossa of hypopharynx were observed（B）.

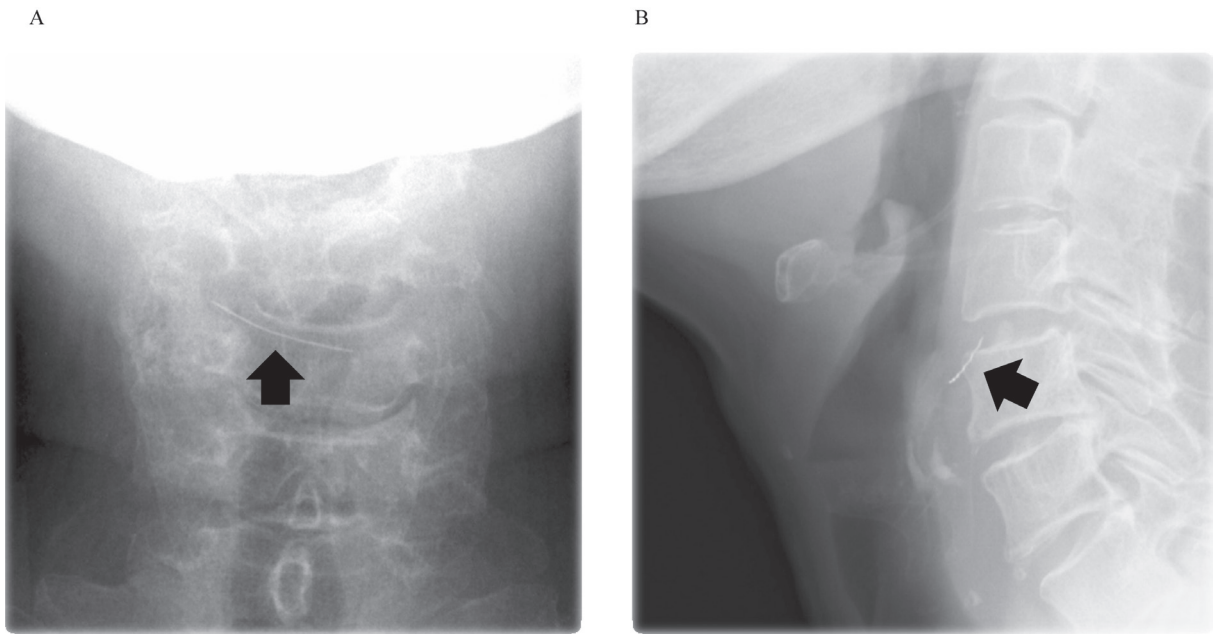

Fig. 2. Soft tissue X-ray of neck and showing foreign body（arrow）. （A） Frontal view. （B） Lateral view.

cosal tissue of the hypopharynx by soft tissue X-ray of the neck（Fig. 2）and a CT scan（Fig. 3）. The foreign body had inserted horizontally in the sub-mucosal tissue of the hypopharynx. The foreign body was suspected for the fish bone, and an operation was planned under general anesthesia on the same day.

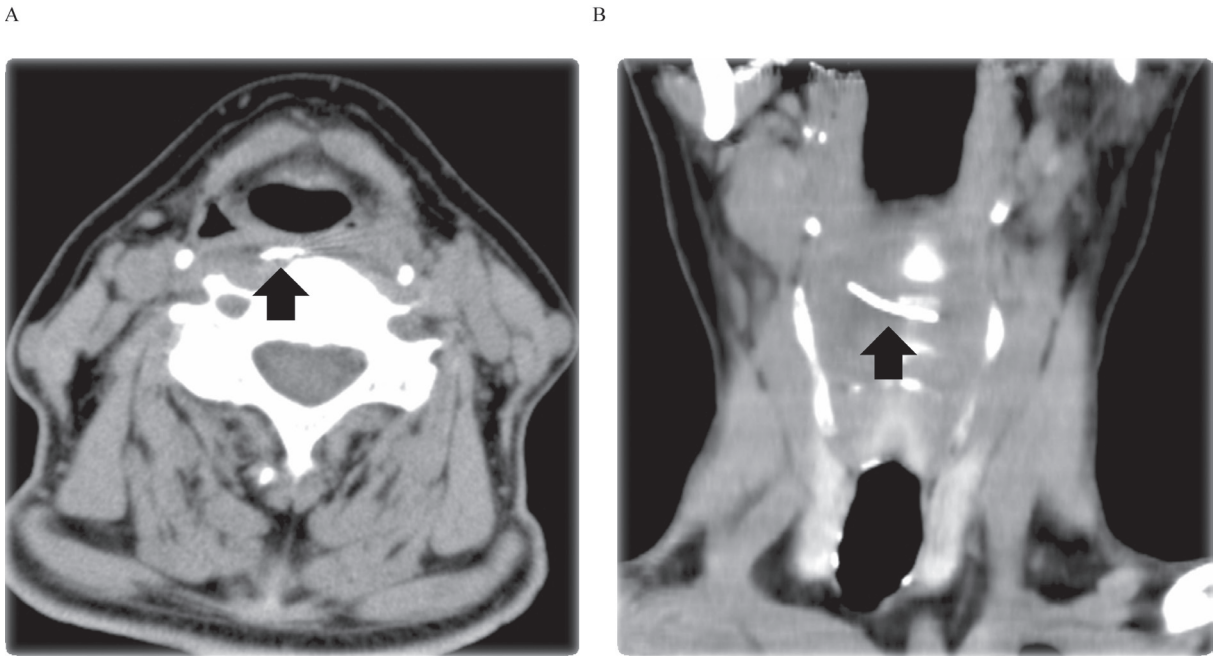

Fig. 3. CT scan showing the foreign body（arrow）.（A）Horizontal section.（B）Coronal section.

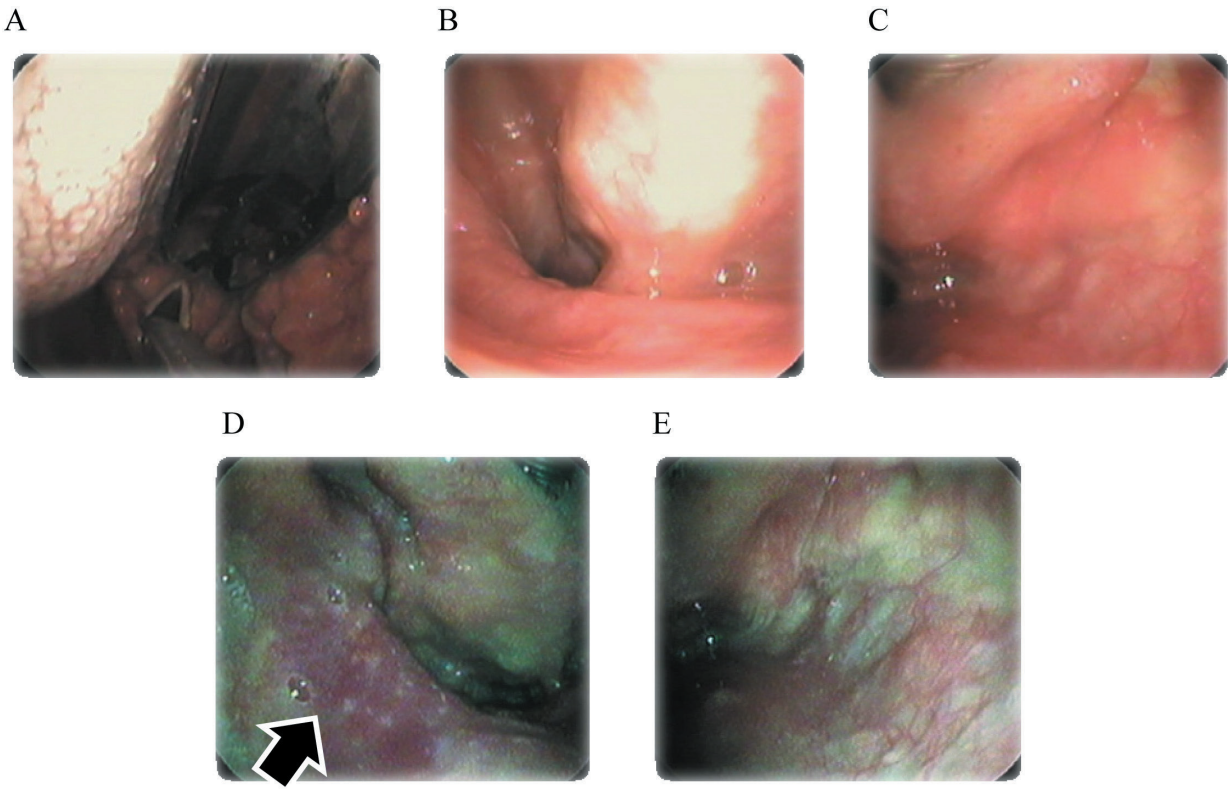

Fig. 4. Endoscopic view with curved laryngo-pharyngoscope in operation.（A）Whole view of larynx and hypopharynx.（B）Left piriform fossa by conventional view.（C）Right piriform fossa by conventional view.（D）Left piriform fossa with sub-mucosal hemorrhage（arrow）by i-scan view.（E）Right piriform fossa by i-scan view.

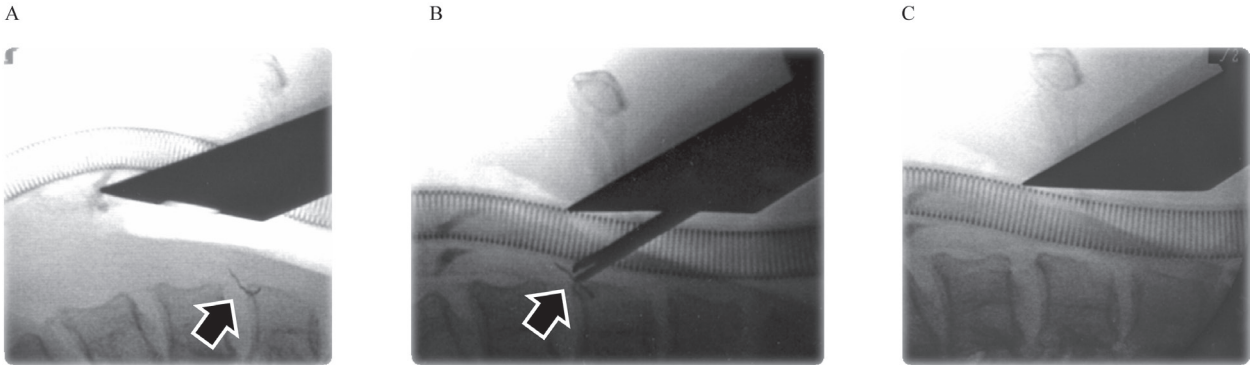

Fig. 5. Image intensifier X-ray showing the foreign body（arrow）.（A）Before removal.（B）Foreign body held with cup forceps.（C）After removal.

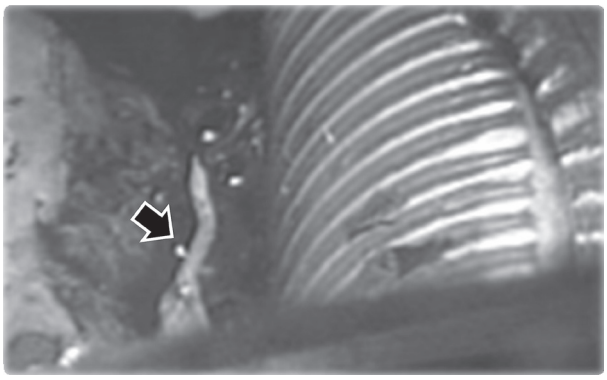

Fig. 6. View of the operation field with the foreign body（arrow）through the laryncoscope.

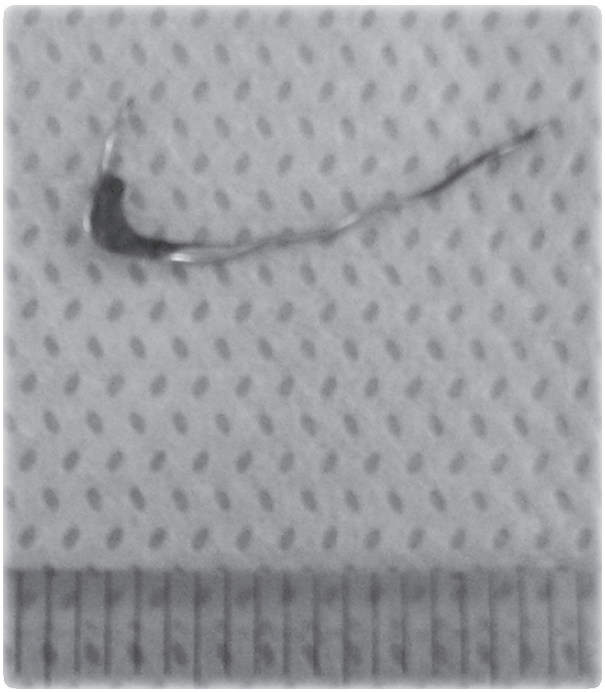

Fig. 7. Removed metal wire of 21 mm in length.

Surgical approach:

Firstly, an endoscopic observation was performed with a curved laryngo-pharyngoscope［3, 4］. By using this laryngo-pharyngoscope（Fig. 4-A）, the cavity of the hypopharynx and cervical esophagus became widely open to facilitate observation with an endoscope（HOYA Co., Ltd. Tokyo）. The endoscope, developed with the digital technology, make it possible to emphasis the contrast of a picture, called i-scan［5］. i-scan technology is the newly developed image enhanced endoscopy technology. This consists of three types of algorithms: surface enhancement（SE）, contrast enhancement（CE）, and tone enhancement（TE）. The algorithm then alters the color frequencies of each component and recombines the components to a single, new color image. This is designed to enhance minute mucosal structures and subtle changes in color. Observation with i-scan imagery revealed submucosal hemorrhage of the left posterior wall of the hypopharynx when compared with a conventional view（Fig. 4-B, C, D, and E）. However, the foreign body was unable to be identified with this endoscope.

Next, the usual laryngoscope was inserted and the posterior wall with the sub-mucosal hemorrhage was cut vertically. However, the foreign body was not visible. Therefore, an image intensifier was em-

ployed in order to remove the foreign body. The tip of the laryngoscope was fixed to the site of the foreign body according to the image. The cup forceps were inserted from the incision portion of the posterior wall, and the foreign body was held with the forceps and drawn out according to the image (Fig. 5 and 6). It was discovered that the foreign body was a metal wire and not a fish bone (Fig. 7).

Post surgery:

Post-operative observation was performed for two days after the operation. The wound healed spontaneously, and oral food intake as a soft diet began. The patient was discharged from our hospital on day 5 post operation. The foreign body was part of a sieve which she had used for washing eggplants.

DISUCCSION

The use of an image intensifier is well established. It is used for reposition of fracture in orthopedics, ERCP (endoscopic retrograde cholangiopancreatography) or insertion of ileus tube in gastroenterology, ESWL (extracorporeal shock wave lithotripsy) in urology, angiography and intravascular surgery in circulatory and neurosurgery. But it is very unfamiliar tool for otolaryngologists, and is only used for the examination of swallowing function or the assessment of leakage after reconstructive surgery of pharynx.

It is very difficult to find and remove a foreign body embedded in a deep portion of submucosal tissue in the pharynx. Concerning the removal of the foreign body in deep portion of tongue, the usefulness of ultrasonography has been reported [6, 7]. However, when a foreign substance exists in the hypopharynx, it is difficult to find the foreign body using ultrasonography because of the interference cased by thyroid cartilage and cricoids cartilage. Regarding the method of operation for removing the embedded foreign body, there are generally two patterns of extraction: extracervical incision and direct laryngoscopy. Various complications were reported by Tomoda et al. with the extracervical incision such as esophageal abscess, hemorrhage, fistula formation, and recurrent nerve palsy [8]. On the other hand, the use of a laryngoscope has been reported to be a less invasive method [9, 10]. In our case, we chose direct laryngoscopy as a less invasive method because there was no deep neck infection. However, the foreign body could not be found only with the laryngoscopy. Previously we had extracted the foreign body embedded in sternocleidomastoid muscle with skin incision using an image intensifier. In this case with the submucosal foreign body of hypopharynx, the foreign body was detected by soft tissue X-ray examination, so we thought of removing using it.

Foreign body impaction in the pharynx is a common case for ENT emergency. Foreign bodies, especially fish bones, are usually impacted into the oropharynx, and are easily found and removed. It is rare for a foreign object to exist under the submucosal tissue. Generally, a pharyngeal foreign body is detected by an X-ray soft tissue neck lateral view and a CT scan. Although the diagnostic accuracy of a CT scan is almost 100%, that of an X-ray is only 33-55% [11, 12, 13, 14]. In our case, the foreign body was identified by both the X-ray soft tissue neck lateral view and frontal view. Furthermore, the artifact was reflected as a foreign body following the CT scan. We had concluded that the foreign body must be a fishbone from the hospital's clinical history before surgical intervention, even though there were some controversies in image analysis. However, it was evident that it was not a fish bone after inspecting the picture in detail.

There are only few reports regarding the removal of a pharyngeal foreign body using an image intensifier [15]. Taking into consideration that 33-55% of fish bones are detected by soft tissue X-ray examination [3, 4, 5, 6], even if a foreign body were to exist in the submucosal portion of the pharynx, it must be extracted with less invasive techniques by employing a laryngoscope and an image intensifier.

CONCLUSION

The image intensifier is a useful tool for localizing radio-opaque foreign bodies embedded in tissues. The simultaneous employment of both a laryngoscope and an image intensifier can be advantageous as a less invasive technique to remove pharyngeal submucosal foreign bodies at an acute phase of disease without deep neck infection.

REFERENCES

1) Matsui T, Ymada K, Muramatsu H, Saito Y, Kawaguchi H, Watanabe Y and Kimura T (1996) A statistical analysis of patients with foreign bodies in our hospital during the past 7 years(1988-1995). *Practica Otalogica* 89: 95-101. (Eng Abstr)

2) Wada I and Kase Y (2008) Statistical study on the cases with pharyngeal foreign bodies (21 years): 737 cases with pharyngeal foreign bodies. *Stomato-pharyngol* 20: 369-375. (Eng Abstr)

3) Satou Y, Omori T and Tagawa M (2006) Treatment of superficial carcinoma in the hypopharynx. *Nihon Jibiinkoka Gakkai Kaiho* 109: 581-586. (Eng Abstr)

4) Onoda T, Nomiya S, Kariya S and Nishizaki K (2009) Sato curved laryngoscope usefulness in fish hook removal from the cervical esophagus. *Stomato-pharyngol* 22: 215-218. (Eng Abstr)

5) Kodashima S and Fujishiro M (2010) Novel image-enhanced endoscopy with i-scan technology. *World J Gastroenterol* 16: 1043-1049.

6) Nariai Y, Ynai C, Kondo S, Ishibashi H , Egawa M, Kitagaki H and Sekine J (2010) A fish bone in the tongue: A report of a case. *Asian J Oral Maxillofac Surg* 22: 30-32.

7) Pigott DC, Buckingham RB, Eller RL and Cox AJ 3rd (2005) Foreign body in the tongue: a novel use for emergency department ultrasonography. *Ann Emerg Med* 45: 677-679.

8) Tomoda C, Kataoka H, Suzuki M, Yazawa Y, Kitajima K and Hanada M (1999) Two cases of foreign body ingestion that required an extracervical incision. *Practica Otalogica* 92: 763-768. (Eng Abstr)

9) Kitamura M, Yuki K, Hayasi M and Tateya I (1999) Long-standing fish-bone foreign body in extrapharyngeal space ; a case report. *Practica Otalogica* 92: 1217-1220. (Eng Abstr)

10) Sawai R, Komori M, Endo M and Kato T(2010) A case report of extrapharyngeal foreign body in a cervical abscess removed by direct laryngoscopy. *Oto-Rhino-Laryngoroly, Tokyo* 53: 415-419. (Eng Abstr)

11) Akazawa Y, Watanabe S, Nobukiyo S, Iwatake H, Seki Y, Umehara T, Tsutsumi K and Koizuka I (2004) The management of possible fishbone ingestion. *Auris Nasus Larynx* 31: 413-416.

12) Eliashar R, Dano I, Dangoor E, Braverman I and Sichel JY (1999) Computed tomography diagnosis of esophageal bone impaction: a prospective study. *Ann Otol Rhinol Laryngol* 108: 708-710.

13) Hiraumi H, Tabuchi K and Kitajiri S (2000) The efficiency of CT scans in diagnosing fishbone foreign bodies. *J Jpn Bronchoesophagol Soc* 51: 382-386 (Eng Abstr)

14) Palme CE, Lowinger D and Petersen AJ (1999) Fish bones at the cricopharyngeus: a comparison of plain-film radiology and computed tomography. *Laryngoscope* 109: 1955-1958.

15) Bhatt C, Reddy NV and Reddy TN (2003) Removal of sub-mucosal foreign body (metal wire) from the pharynx using image intensifier. *J Laryngol Otol* 117: 902-904.