

Endoscopic Removal of a Migrated Fragment of Wire used for Intermaxillary Fixation in Surgical Treatment of Mandibular Fracture

TOSHINORI IWAI¹, SATOMI SUGIYAMA², TOSHIYUKI KOIZUMI³, MAKOTO HIROTA⁴, KENJI MITSUDO⁵

Keywords: Endoscope, Foreign body, Mandible

A 63-year-old woman fell and hit the right side of the mandible directly on the floor, and visited our department with right side of the lower jaw pain and intraoral bleeding as the chief complaint. She also had trismus. She had no present and past significant medical and dental histories. Intraoral examination showed malocclusion (imperfect positioning of the teeth when the jaws are closed) and intraoral bleeding from the fractured site. Panoramic radiograph showed fracture of the right posterior body of the mandible and the root fracture of the right second molar. Therefore, she underwent open reduction and internal fixation of the mandibular fracture under general anaesthesia. An intraoral incision was made along the ascending ramus and cervical gingiva of the mandibular right second molar and vertical gingival incision was made at the mesial aspect of the mandibular right second molar. The second molar was removed after the flap elevation, and six 2.0 mm diameter intermaxillary fixation screws (Dual-Top Auto Screw II®, Jeil Medical Corporation, Seoul, Korea) were used for intraoperative intermaxillary fixation. After the bone reduction and intermaxillary fixation with wires, two plates fixation was performed with 2.0 mm fixation system (Universal Mandible®, Stryker, Tuttlingen, Germany). The 0.3 mm diameter steel wires were cut and removed, and the wound was closed with resorbable suture (VICRYL®). Surgical time was 172 min. The next day, panoramic radiograph and computed tomography revealed a wire fragment below the right inferior border of the mandible [Table/Fig-1]. Therefore, she underwent removal of the wire fragment under general anaesthesia. Because the wire fragment was small (6 mm length), the removal was performed using a 30-degree, 4-mm-diameter endoscope with tissue retractor (Karl Storz, Tuttlingen, Germany) [Table/Fig-2]. An intraoral incision was made along the ascending ramus and cervical gingiva of the mandibular right second molar and vertical gingival incision was made at the mesial aspect of the mandibular right second molar. This incision was opened during second surgery by suture removal. The sutures were removed and intraoral wound was opened. After the retractor was inserted into the wound, the endoscope was inserted intraorally and blindly in the surgical space, and additional space-making was performed by the tissue retractor of the endoscope. The small wire fragment was identified on the lateral side of the right inferior border under endoscopic guidance [Table/Fig-3], and removed completely using a long mosquito forceps (FOUR MEDICS, Tokyo, Japan) without the use of 3D C-arm prepared [Table/Fig-4]. The wound was closed with resorbable suture (VICRYL®). Furthermore, re-fixation of plates was performed due to insufficient plate fixation in the initial surgery. Panoramic radiograph after second surgery showed no wire fragment [Table/Fig-5]. The patient was discharged 7 days after first surgery.

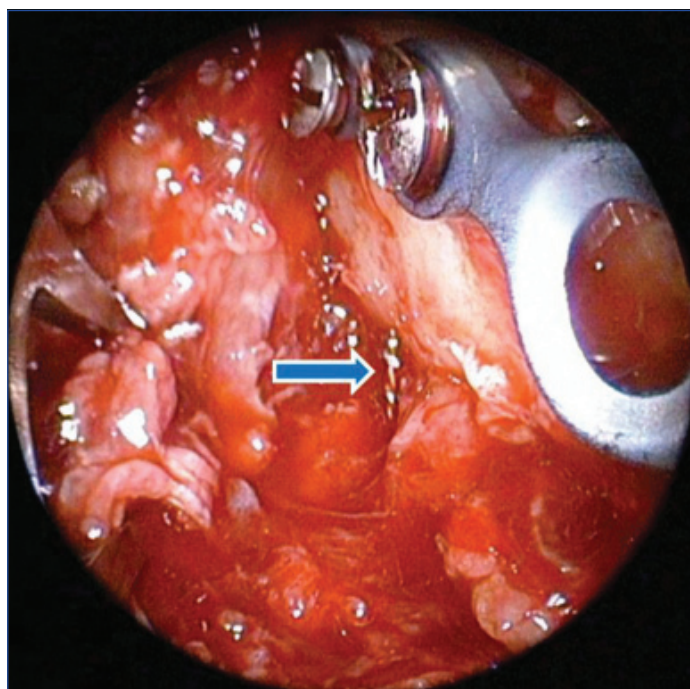
Foreign bodies are sometimes migrated in the tissues in head and neck by trauma [1-3], but iatrogenic foreign bodies, such as broken needles or instruments, teeth, roots, and dental implants are also reported [4-8]. Foreign body removal is challenging



[Table/Fig-1]: Panoramic radiograph and Computed Tomography (CT) show a wire fragment (arrow) below the right inferior border of the mandible. a) Panoramic radiograph; b) Axial CT image; c) Coronal CT image.

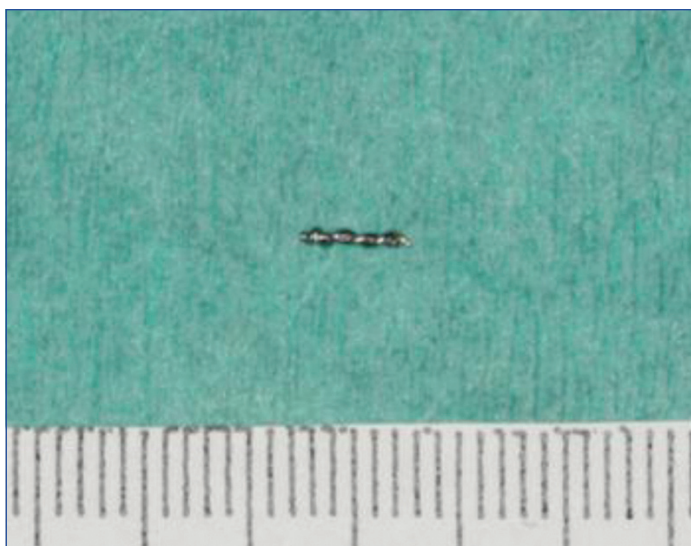


[Table/Fig-2]: A 30-degree, 4-mm-diameter endoscope with tissue retractor.



[Table/Fig-3]: Endoscopic view. Arrow indicates a wire fragment on the lateral side of the inferior border of the mandible.

for the complexity of the approach and the proximity to vital anatomical structures such as nerves and vessels [3], and blind exploration is often time-consuming and sometimes futile [4]. Therefore, preoperative localisation and intraoperative identification of foreign bodies are required.



[Table/Fig-4]: Removed wire fragment.



[Table/Fig-5]: Postoperative panoramic radiograph showing absence of wire fragment.

Foreign bodies retained in the head and neck region may cause complications including infection such as sinusitis or meningitis, pain, fistula, metal relevant poisoning, or cancer [1].

Several methods have been used to detect and localise foreign bodies, such as radiograph, computed tomography, magnetic resonance imaging, ultrasonography [4], C-arm fluoroscopy [4-6], navigation system [1,2,4,7], endoscope [1-3,8]. Preoperative

imaging methods cannot allow intraoperative identification of foreign bodies. Intraoperative ultrasonography cannot show foreign bodies migrated in deep tissues. Navigation systems help identify the location of foreign bodies three-dimensionally and intraoperatively, but the intraoperative displacement of foreign bodies migrated in the soft tissues makes the identification difficult. Although C-arm fluoroscopy has radiation exposure, it can provide real-time two-dimensional image. Especially, 3D C-arm allows not only planar images but also 3D images as CT. Because endoscope can provide good illumination, clear and magnified visualisation of the surgical field, it is used for removal of foreign body in deep regions, such as condylar process [3] and maxillary sinus [8]. Although the intraoral approach without a visible scar and facial nerve injury has restricted surgical field and difficult access, even small foreign bodies can be identified under endoscopic guidance. In the present case, a small wire fragment retained on the lateral side of the right inferior border, could be successfully removed under magnified view of the endoscope, without the use of 3D C-arm.

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PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Oral and Maxillofacial Surgery/Orthodontics, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.
2. Clinical Fellow, Department of Oral and Maxillofacial Surgery/Orthodontics, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.
3. Assistant Professor, Department of Oral and Maxillofacial Surgery/Orthodontics, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.
4. Associate Professor, Department of Oral and Maxillofacial Surgery/Orthodontics, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.
5. Professor, Department of Oral and Maxillofacial Surgery/Orthodontics, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Toshinori Iwai,
3-9 Fukuura Kanazawa-ku, Yokohama, Kanagawa, Japan.
E-mail: iwai104oams@yahoo.co.jp

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jun 23, 2020
- Manual Googling: Sep 05, 2020
- iThenticate Software: Oct 15, 2020 (8%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? NA
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jun 22, 2020**

Date of Peer Review: **Jul 29, 2020**

Date of Acceptance: **Sep 07, 2020**

Date of Publishing: **Nov 01, 2020**