

Subcutaneous Emphysema Caused by Third Molar Extraction

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Computed tomography (CT) was performed in a 28-year-old woman, who was scheduled for carbon-ion radiotherapy (C-ion RT) for osteosarcoma of the right mandibular condyle (**Figure 1**, red arrow); CT confirmed the presence of air around the right parapharyngeal space (indicated by the yellow arrows in **Figures 1-3**). Palpation confirmed crepitus in the lower jaw and neck; no spontaneous symptoms were observed. The subcutaneous emphysema possibly developed when the right mandibular, semi-impacted, horizontally placed third molar was extracted after sectioning using an air-turbine handpiece 2 days before CT imaging; the extraction was performed before C-ion RT to ease oral care

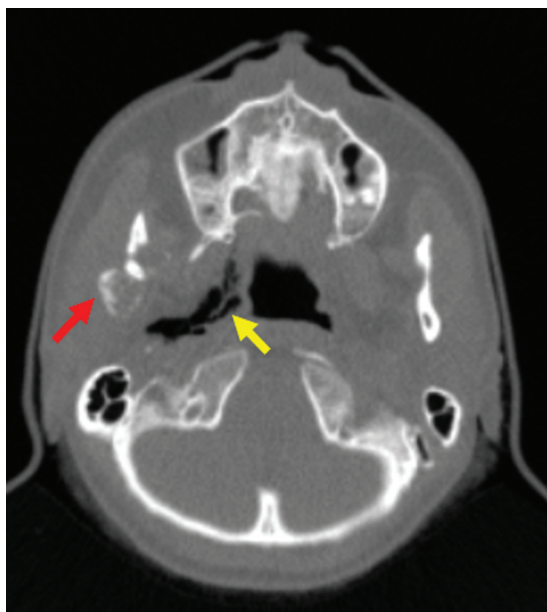


Figure 1. Osteosarcoma of the right mandibular condyle (red arrow). The presence of air around the right parapharyngeal space in the maxilla level (indicated by yellow arrows) was confirmed by computed tomography.

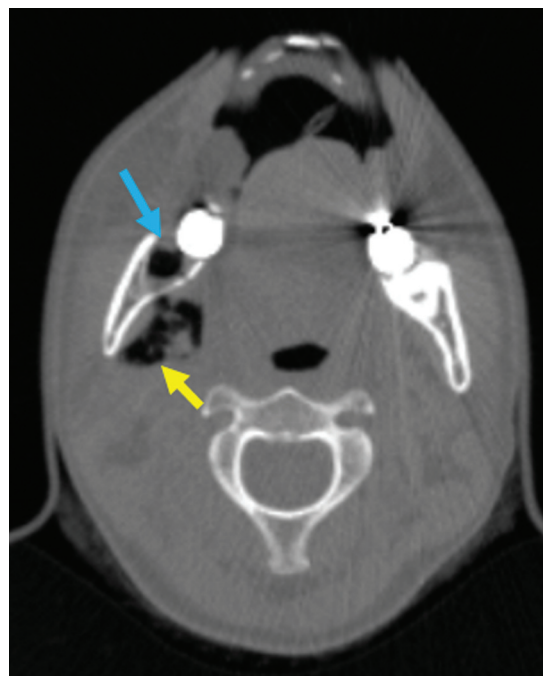


Figure 2. The blue arrow indicates the socket from which the third molar was extracted. The presence of air around the right parapharyngeal space in the mandible level (indicated by yellow arrows) was confirmed by computed tomography.

following irradiation to the head and neck region, as food impaction was likely to occur under the mucosa overlying the semi-impacted tooth.¹ The blue arrow indicates the socket from which the third molar was extracted (**Figure 2**). In this case, it is probable that when the mucoperiosteal flap formed and the third molar was sectioned with an air-turbine handpiece, air invaded the soft tissues from the mucoperiosteal flap² and spread to the parapharyngeal space (**Figure 4**). This pathway is similar to that of odontogenic infections.³

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Figure 3. The presence of air around the right parapharyngeal space in the neck level (indicated by yellow arrows) was confirmed by computed tomography.

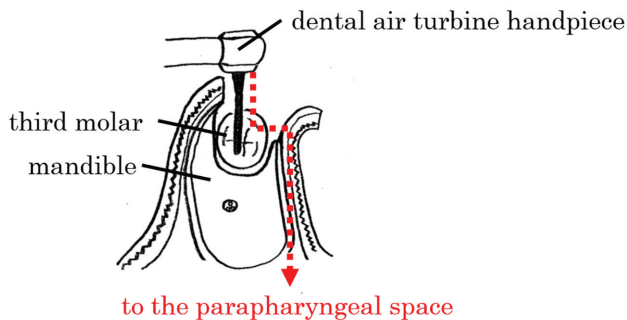


Figure 4. Illustration of the air pathway from the dental air-turbine handpiece during a third molar extraction (coronal section). The red dotted arrow indicates the air pathway.

Emphysema in this case could have possibly affected C-ion RT because particle beam therapy (such as C-ion and proton beam RT) is easily affected by air gaps. In fact, the physical properties of particles are more sensitive than photon therapy

for planning uncertainties, and this may negatively affect the quality of particles.⁴ C-ion RT was therefore postponed. Two weeks later, air was not observed on repeat CT. During irradiation, no complications developed owing to the subcutaneous emphysema, and treatment was completed successfully. Tooth extraction requiring sectioning of the tooth using an air-turbine handpiece should be performed a few weeks before the planned CT, especially in cases planned for particles to the head and neck region.

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Author Contributions

Atsushi Musha, drafted the original manuscript, analyzed the treatment and contributed to the final drafting of the manuscript, read and approved the final manuscript; **Tatsuya Ohno**, analyzed the treatment, contributed to the final drafting of the manuscript, read and approved the final manuscript.

Disclosures

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Ethical Approval

Gunma University Hospital Clinical Research Review Board exempted this study from the regular institutional review board review process due to the retrospective noninvasive and observational nature of the study.

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