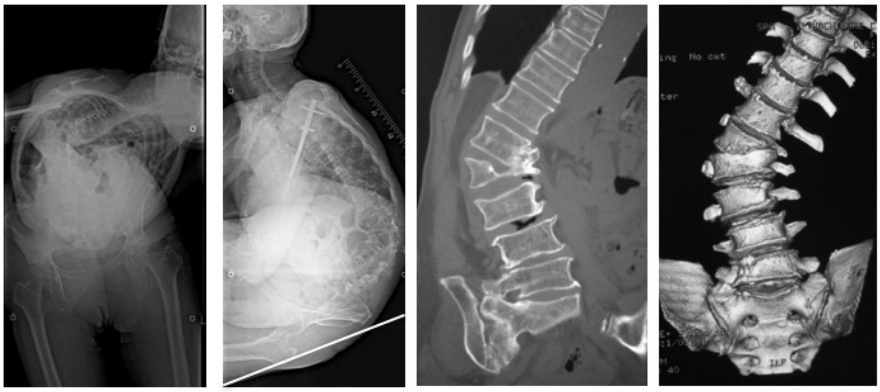


**Figure 1:** Preoperative standing X-ray and computed tomography. (**a)** Anterior-posterior radiograph. C7 plumb line was 30 mm lateral to sacral center. (**b)** Excessive kyphoscoliosis of the thoracolumbar spine is present; the cervical spine is in extension. White line shows gravity line. (**c)** A vertebral compression fracture is present at L2. (**d)** L1 vertebra is migrating to L2.

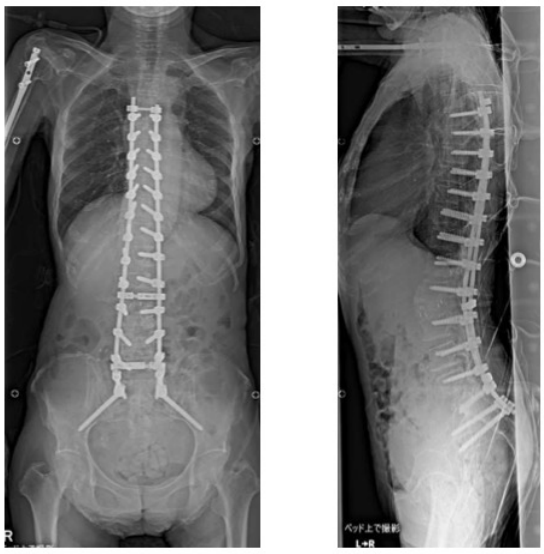


**Figure 2:** Postoperative X-ray in supine position. (**a)** Anterior-posterior radiograph. Corrective spinal surgery with resection of L2 and instrumentation from T4 to pelvis was performed. Good coronal alignment is achieved. (**b)** Lateral radiograph. Proper lumbar lordosis is achieved.

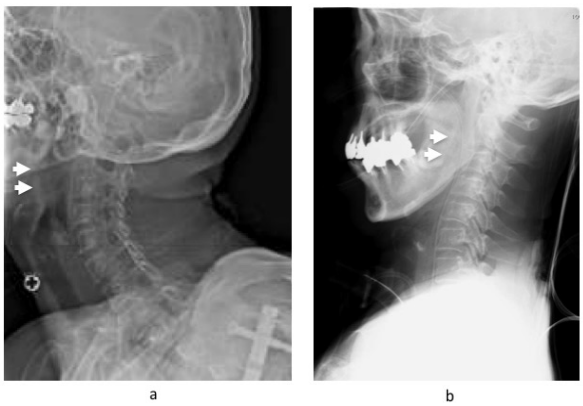


**Figure 3:** Pre- and postoperative X-ray of cervical spine. (**a)** Preoperative standing X-ray of cervical spine. Airway is open (arrowhead). (**b)** Postoperative supine X-ray of cervical spine at airway obstruction. Airway is closed (arrowhead).

muscle rigidity. A swallowing test showed no accidental aspiration. The patient started oral intake, and 1 year after surgery could again feed herself; her respiratory condition also improved. The patient was able to maintain a sitting position in her wheelchair, and could walk with walker support.

## Discussion

Camptocormia in Parkinson's disease can be a great source of disability. Patients benefit from corrective surgery, despite the high complication rate [6]. Although many complications related to spine surgery have been reported in patients with Parkinson's disease [1-4], life-threatening upper airway obstruction has rarely been reported [7,8].

If patients are unable to take oral anti-Parkinson medication easily after surgery, upper airway obstruction can occur. Patients with Parkinson's disease are at greater risk for specific complications after abdominal or spine surgery, including urinary-tract infection, aspiration pneumonia, bacterial infection [4], and blood pressure instability [9]. Post-operative laryngospasm, sialorrhea, dysphagia, and esophageal dysmotility increase the risk of aspiration pneumonia [10]. There are only two reports of upper airway obstruction in a patient with Parkinson's disease [7,8]. One case experienced upper airway obstruction immediately after extubation caused by laryngospasm [7]. The patient required tracheal intubation for over 12 hours because of respiratory arrest caused by side effect of medicine. Her post-extubation laryngospasm was thought to be related to Parkinson's disease. Another case experienced upper airway obstruction caused by withdrawal of L-dopa in a patient with Parkinson's disease who was fasted before surgery [8]. The patient omitted anti-Parkinson medication for 2days before surgery, and had an obstructed upper airway. In the present case, the cause of upper airway obstruction was suspected due to worsening of Parkinson's disease itself because this patient had not taken anti-Parkinson drugs properly until the occurrence of the current complication (during 4 weeks after surgery). Not only the post-operative sagittal alignment must have been fine but also cervical spine had never been fixed, therefore, the corrective surgery of the thoracolumbar spine seemed to have an insignificant effect.

## Conclusion

In conclusion, life-threatening upper airway obstruction can occur after corrective spine surgery in patients with Parkinson's

disease. It is important to ensure oral administration of anti-Parkinson medication after surgery. If post-operative oral administration is difficult, a nasogastric tube can be considered to ensure medication administration.

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### Ethics Approval and Consent to Participate

Not applicable.

### Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal.

### Availability of Data and Materials

All data supporting our findings are contained within the manuscript.

### Competing Interests

The authors declare that they have no competing interests.

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### Authors' Contributions

T.K. was the major contributor in writing the manuscript. N.M., E.A., T.A., K.K., K.H. and Y.S. supervised the whole work. All authors read and approved the final manuscript.

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