Iatrogenic long thoracic nerve injury and scapular winging in posterior spinal fusion surgery: A case report

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Abstract
This is an extremely rare case of scapular winging following posterior spinal fusion for correction of adolescent idiopathic scoliosis in an 18-year-old boy due to iatrogenic injury to a long thoracic nerve. Scapular winging manifested 5 days after the operation and spontaneously improved after 7 months.

KEYWORDS
adolescent idiopathic scoliosis, long thoracic nerve injury, posterior spinal fusion, scapular winging

INTRODUCTION

The long thoracic nerve (LTN) innervates the serratus anterior muscle (SAM), which is involved in upper limb abduction and elevation. LTN injury could result in SAM dysfunction and cause scapular winging. This condition is generally painful and limits the functional activities of the upper limb. Various etiologies have been introduced for LTN injury, including traumatic, iatrogenic, and idiopathic. Iatrogenic LTN injury is frequently reported in cardiac surgeries. However, the occurrence of LTN injury following the posterior spinal fusion (PSF) surgery for the treatment of adolescent idiopathic scoliosis (AIS) is scarcely reported.

In this study, we report a case of iatrogenic LTN injury in an 18-year-old boy who was presented with scapular winging after the treatment of AIS by posterior spinal fusion and instrumentation (PSFI).

CASE PRESENTATION

An 18-year-old boy with no past medical history underwent PSFI (T2 to L4) for the treatment of AIS (Figure 1). Surgery was performed under general anesthesia, and the patients were placed in the prone position. After sterile prepping and draping, paravertebral muscles were dissected. Pedicular screws were applied on both sides from...
T2 to L4. Derotation and curve correction maneuvers were performed, and after two rods placements, thoracic and lumbar curves were corrected up to the possible safe limit. Then the irrigation and decortication for posterior fusion were performed, and meticulous hemostasis was done. Finally, anatomic wound closure was achieved,
and the patient was transferred to the recovery room. Total bleeding was 600 cc. The surgery was uneventful. Intraoperative spinal cord monitoring was stable throughout the surgery. Postoperative neurologic examinations were normal, as well.

Five days after the surgery, the patient noted medial winging of his right scapula without pain (Figure 2A). Shoulder function was not restricted. In EMG/NCV examination of the right upper limb, no evidence of plexopathy, radiculopathy, myopathy, or polyneuropathy was noticed. In the EMG test, normal latencies and amplitudes were observed for all tested nerves. However, no activity was observed at the violation of the serratus anterior, which was consistent with severe injury of right LTN.

No intervention was done for the treatment of scapular winging. LTN neuropraxia resolved spontaneously after 7 months. The final EMG/NCV examination revealed no LTN injury. Scapular winging was also resolved (Figure 2B,C).

3 | DISCUSSION

Iatrogenic complications such as neurologic deficits are frequently reported in spinal surgeries such as PSF. However, LTN injury and scapular winging are not expected as an iatrogenic complication of PSF because LTN is not exposed in spinal fusion surgeries with a posterior approach. In this study, we reported a case of LTN injury and scapular winging in an 18-year-old boy nearly 5 days after the PSFI. The deficit was spontaneously resolved after about 7 months.

Long thoracic nerve injury could occur for various etiologies such as infection, toxicities, sports injuries, and surgeries that require thoracotomy such as radical mastectomy, first rib resection, and anterior spinal fusion. However, LTN injury and scapular winging following the PSF surgery have no clear justification.

To date, LTN injury after PSF surgery has only been reported in one earlier study. Tsirikos and Al-Hourani reported the development of LTN neuropraxia in two patients with AIS, 4 and 6 days after posterior spinal arthrodesis, while the surgery was uneventful and intraoperative spinal cord monitoring was stable during the whole procedure. Similar to the present case, the shoulder function was not affected. Scapular winging resolved in both patients spontaneously, 8 and 11 months after the operation. They attributed the LTN injury to the positioning of the patients or using heavy retractors and suggested considering this complication during spinal deformity surgery to avoid potentially permanent injury to the LTN nerve.

The exact etiology of LTN injury in PSF is not clear because the thorax is not opened, and the LTN is not exposed.

Patient positioning and placement of surgical retractors are noted as the most probable causes of LTN injury in PSF. Although the deficit was resolved spontaneously in our case, surgical intervention is required for patients who do not respond to conservative treatment. The legal aspect of this complication should also be kept in mind because the patient might sue for the damage. For these reasons, a meticulous patient positioning without head flexion, rotation, tilting, and arm overextension, besides careful placement of the surgical retractors, are recommended to avoid LTN injury and its subsequent potential complications.

4 | CONCLUSION

Long thoracic nerve injury could be regarded as a rare complication of PSF surgery. The exact pathogenesis of this iatrogenic complication is not clear. However, it could be attributed to the patient positioning and retractor placement. Therefore, careful placement of patients and retractors is necessary to avoid iatrogenic LTN injury during PSF surgery.

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None.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTION

M.S and H.G performed the surgery. S.M.M wrote the manuscript. M.C wrote and edited the manuscript.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal’s patient consent policy.

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