Long-term Observation of Respiratory Function After Unilateral Phrenic Nerve and Multiple Intercostal Nerve Transfer for Avulsed Brachial Plexus Injury

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BACKGROUND
Phrenic nerve transfer (PNT) or multiple intercostal nerve transfer (MIT) alone are reported to have no significant impact on pulmonary function in the short or medium term, but it has rarely been reported whether the combination of PNT-MIT could influence respiratory function in the long term.

OBJECTIVE
Respiratory function was evaluated after PNT and PNT-MIT 7 to 19 years (mean, 10 years) postoperatively.

METHODS
Twenty-three adult patients with brachial plexus avulsion injuries who underwent PNT-MIT were compared with 19 corresponding patients who underwent PNT. Pulmonary function testing, phrenic nerve conduction study, and chest fluoroscopy were performed. In the PNT-MIT group, further investigation was performed on the effect of the number of transferred intercostal nerves and the timing of MIT.

RESULTS
1. In the PNT-MIT group, forced vital capacity, forced expiratory volume in one second, and total lung capacity were 73.69%, 72.04%, and 74.81% of predicted values without significant differences from the PNT group. Diaphragmatic paralysis permanently existed with 1 to 1.5 intercostal spaces (ICSs) elevation and near 1 ICS reduced excursion. (Figure 1)

2. There was no statistical difference between the PNT and PNT-MIT groups. (Figure 1)

3. Furthermore, 3 and 4 intercostal nerves transferred resulted in no further decrease in pulmonary function test results than 2 intercostal nerves. (Figure 2)

4. No significant difference was found when PNT and MIT were performed at the same stage or with an interval. (Figure 3)

CONCLUSIONS
PNT-MIT did not result in additional impairment in respiratory function in adult patients compared with PNT alone. It is safe to transfer 2 to 4 intercostal nerves at 1 to 2 months delay after PNT.