Radial Artery Perforator Adiposal Flap for Coverage of the Neurolysed Median Nerve

*Ema Onode MD1) Kosuke Shintani MD, PhD1) Takuya Yokoi MD, PhD1) Takuya Uemura MD, PhD1) Mitsuhiro Okada MD, PhD1) Kiyohito Takamatsu MD, PhD1) Hiroaki Nakamura MD, PhD1)

1) Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine
2) Department of Orthopaedic Surgery, Osaka General hospital of West Japan Railway Company
3) Department of Orthopaedic Surgery, Yodogawa Christian Hospital Osaka Japan

[Introduction]
- Over the past decades, myocutaneous flaps have been progressively replaced by perforator flaps for repair of skin defects. Perforator flaps have reduced donor-site morbidity without the need for sacrificing source vessels. Ono S, et al. J Hand Surg Am. 2011.
- Adhesion neuropathy of the median nerve with persistent pain and numbness can be a challenging problem. Current opinion dictates that coverage of the median nerve with well-vascularized soft tissue is important after secondary neurolysis. Jones NP, et al. Plast Reconstr Surg. 2012.
- In the present study, we introduced a novel method using a radial artery perforator (RAP) adiposal flap for coverage of the neurolysed median nerve to minimize reformation of scar adhesion.

[Material and methods]

Patients
- Median nerve neuropathy after primary surgery 8 patients who had previously undergone nerve surgeries; 3 repair of a median nerve laceration, 4 primary OCTR, 1 ORIF of the distal radius fracture
- Mean age; 65 years (42 - 89 years)
- Average time interval between the prior nerve surgery and re-exploration; 19months (5 - 72 months)
- Average follow-up period; 13 months (4 - 28 months)
- All had substantial median nerve hypersensitivity at the level of the wrist surgical scar.

Contraindications
- Trauma to the volar forearm, Rheumatoid arthritis, Infections, Proliferative synovitis

Evaluations
- Size of radial artery perforator adiposal flaps, Pain VAS, Wrist ROM, Scores of the quick DASH and Hand 20
- Nerve conduction study; Distal latency of APB-CMAP, Presence of a Tinel sign at the wrist surgical scar

Postoperative healing processes, Complications

[Results]

- Size of RAP adiposal flap
  - Pre-op (Mean): 108mm² (750-1200)
  - Post-op (Mean): 120mm² (900-1500)

  - APB-CMAP Distal latency (ms)
    - No response: 8.5ms
    - (4 cases)
    - Slight pigmentation of the volar wrist skin in a case
    - No skin necrosis or deep infection

  - Quick DASH scores
    - 47
    - 21
  - Hand20 scores
    - 56
    - 37

- After surgery, the positive Tinel sign on the wrist disappeared in all patients and the increased arc and pain scale score decreased.
- Average arc of wrist motion and average score of the quick DASH improved postoperatively.
- There was no recurrence of median nerve adhesion neuropathy.

[Discussion]

The secondary neurolysis surgery of median nerve
- Atrophic neurolysis
- Excision of the scarred tissues
- Prevention from adhesion

Several surgical procedures to envelope the median nerve following neurolysis
- ADM muscle transposition flap, Palmaris brevis muscle turnover flap, Pronator quadratus muscle transposition flap ⇒ Probrems; Motor loss, Bulkiness
- Hypothenar fat pad flap ⇒ Probrems; Limited size, Limited arc of rotation
- Reverse radial artery fascial flap ⇒ Probrems; Sacrifice of the radial artery, Bulkiness
- Radial artery perforator adipofascial flap, Ulnar artery perforator adipofascial flap ⇒ Probrems; Bulkiness


Radial artery perforator (RAP)
- Anatomical study; At least 2 RAPs were found within 2 cm proximal to the styloid in 100 percent of 26 human cadaveric forearms.
- Color Doppler US; Noninvasive, Convenient, Real time, Preoperative planning

Radial Artery Perforator adiposal flap
- Less bulkiness, Freeing of fascia which may cause median nerve compression, Ease of elevation without division of perforators
- High mobilization up to 180 degrees arc of rotation, Reliability of perforators to the adiposal flap, Production of neither functional motor or sensory loss

[Conclusions]
- The results of interposing the RAP adiposal flap between dysesthetic volar wrist skin and the neurolysed median nerve have been successful in both pain relief and restoration of hand function.
- The coverage with RAP adiposal flap was one of the useful methods to minimize adhesion scar formation and to treat adhesion neuropathy of median nerve.

COI Disclosure
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In connection with this presentation there is no COI to be disclosed with any companies.