

COMMENTARY

OUTCOME OF DYNAMIC COMPRESSION PLATE WITH DORSAL RADIAL SLIDING GRAFT TECHNIQUE FOR WRIST ARTHRODESIS IN BRACHIAL PLEXUS INJURY PATIENTS

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We have meticulously read the article titled "*Outcome of dynamic compression plate with dorsal radial sliding graft technique for wrist arthrodesis in brachial plexus injury patients*". We would like to comment on some aspects of the study and set forth our experience in wrist arthrodesis performed to improve functional outcome in the scenarios cited above. This manuscript aims to highlight the following. First, to the best of our knowledge, there exists a paucity of comparative studies on the use of a reamer/iliac crest /radial sliding graft for total wrist arthrodesis, evaluating fusion times and complications. Second, we propose adult traumatic brachial plexus injury involves injury -particularly of the C7-C8-T1 root injury- as an indication for metacarpophalangeal arthrodesis along with wrist fusion to provide stability of thumb grasp. Third, there is no consensus on the selection criteria for metacarpophalangeal arthrodesis in patients with plexopathy, in order to improve the stability of the hand and thereby improving the activities of daily life. Long-term functional outcome follow-up and patient satisfaction over an extended time frame may also be valuable for future studies to consider.

Keywords: Brachial plexus Palsy; bone deformity; Humeral retroversion; Surgical Planning

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We have meticulously read the article on the 34 cases presented by Jan AU, Cheema TA, Ahmad S, Shafiq M, Hussain B and Ullah F. and titled "*Outcome of dynamic compression plate with dorsal radial sliding graft technique for wrist arthrodesis in brachial plexus injury patients*".¹ We would like to comment on some aspects of the study and set forth our experience in wrist arthrodesis performed to improve functional outcome in the scenario cited above. It is well known that complete plexus lesions entail a lower recovery rates; although surgery times are not yet well-defined in literature, surgeries greater than 6–12 months are associated with poor prognosis with tremendous negative impact on activities of daily life.²

The first aspect to consider is the use of autologous radio bone graft described by the authors in the original work. At our center, we do not use the radial sliding graft technique because extensive brachial plexus lesions typically present with diffuse osteoporosis secondary to the denervation disuse, and muscular atrophy caused by these types of lesions. Therefore, bone harvested from within the neurologically affected area would not be suitable donation.³ The iliac crest is, however, is an alternative corticocancellous bone graft site known to result in fusion at a high rate.⁴

Use of the iliac crest as a donor site is not without its own risk though and may present complications as well. The most frequently reported

of these are fractures, hernia, infections, chronic pain, and injury to the cutaneous femoral nerve. In contrast, evidence is available for the effectiveness of using the reamer as a tool for obtaining autologous femoral bone graft material. However, its use is generally limited to ankle and midfoot arthrodesis. Therefore, we believe that it would be interesting to conduct comparative studies on the use of reamer/iliac crest/radial sliding graft in wrist arthrodesis in patients with extensive nerve lesions.⁵ The other aspect that caught our attention is that from the series published, none of the 34 patients included in the study had metacarpophalangeal arthrodesis (MCF) performed. Although to our knowledge there is no consensus on when to perform MCF in the case of plexus injury scenario, in our experience, the technique is selected depending on the disposition of the hand after the radio-metacarpal fixation with anatomic plates for total wrist fusion; such disposition will depend on the contracture tone of extrinsic and intrinsic muscles of the hand.⁶

Indications for MCF fusion include osteoarthritis of the thumb, rheumatoid arthritis, post-traumatic osteoarthritis, and chronic instability.^{7,8} In lesions of lower brachial roots (C7-C8-T1), besides to the loss of motor function, an unstable wrist and hand drop, the thumb may also—in some cases—result in adduction and flexion posturing due to atrophy of the abductor pollicis brevis muscle. This muscular deficit may lead to suboptimal wrist arthrodesis outcome as

an open hand position may be unstable or impossible to achieve.⁹ Therefore, we suggest expanding the indication for MCF to selected patients with C7-C8-T1 root lesions in which spontaneous recovery, nerve transfer or tendon transfers are not viable options for enhancing the recovery of functional capacity. Some complications have been reported with tendon adhesions being the most frequent, followed by infection and non-union.¹⁰ The argument in favor of performing MCF is that it would provide stability during pincer grip tasks involving the index finger and thumb. This would be interpreted as a biomechanical position of advantage for the thumb without passive opposition limitation and would maintain the opening capability of the first commissure the hand needs for interphalangeal fusion of the thumb and would thereby preserve the passive mobility of this joint next to the trapezium-metacarpal.¹¹ *McKee et al* reported the optimal functional position of the range of motion, with the upper limit at the interphalangeal joint being 30 degrees.¹² Although the definitive position of wrist arthrodesis could not be defined yet, we perform it at 30 degrees of extension and aligned to the third metacarpal. This final position is congruent with the methods described by the Jan AU *et al*.¹ Moreover, we evaluate the final position of the thumb in cases where the position of MCF joint extension is less than 30 degrees. We perform MCF fusion at 30 degrees with rotation and varus/valgus deviation neutral through a dorsal approach between the tendons of the extensor pollicis longus and extensor pollicis brevis. We remove the articular cartilage and stabilize with 2 Kirschner 2.0 mm pins approaching from retrograde; after six weeks, the pins are removed. This manuscript aims to highlight the following. First, to the best of our knowledge, there exists a paucity of comparative studies on the use of a reamer/iliac crest /radial sliding graft for total wrist arthrodesis evaluating fusion times and complications. Moreover, we propose the adult traumatic brachial plexus injury involves injury - particularly of the C7-T1 roots- as an indication of MCF fusion to provide stability of thumb grasp. Third, the lack of consensus on selection criteria patient with plexopathy candidates to perform MCF arthrodesis; i.e., spontaneous recovery, nerve transfer

or tendon transfers are not plausible and in those who have not obtained an acceptable result with previous treatments. However, fusion would be applicable in cases where the wrist fusion with the MCF joint extension does not exceed 30 degrees, in this way we could improve the stability of the hand and thereby improve the activities of daily life. Long-term functional outcome follow-up and patient satisfaction over an extended time frame may also be valuable for future studies to consider.

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