

Molina Clinical Policy

Triangle Tilt and Mod Quad Surgery for Treatment of Obstetric Brachial Plexus Injury: Policy No. 208

Last Approval: 4/13/2022

Next Review Due By: April 2023



DISCLAIMER

This Molina Clinical Policy (MCP) is intended to facilitate the Utilization Management process. Policies are not a supplementation or recommendation for treatment; Providers are solely responsible for the diagnosis, treatment and clinical recommendations for the Member. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (e.g., will be paid for by Molina) for a particular Member. The Member's benefit plan determines coverage – each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their Providers will need to consult the Member's benefit plan to determine if there are any exclusion(s) or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a Member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid Members. CMS's Coverage Database can be found on the CMS website. The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this MCP and provide the directive for all Medicare members. References included were accurate at the time of policy approval and publication.

OVERVIEW

Neonatal brachial plexus palsy (also known as obstetric brachial plexus palsy) is generally caused by excessive traction on the brachial plexus from the forces of labor, fetal position, and maternal pushing. Possible risk factors include large maternal weight gain, maternal diabetes, multiparity, fetal macrosomia/high birth weight, and breech position. The etiology of neonatal brachial plexus palsy has been attributed to iatrogenic lateral traction on the fetal head, typically when shoulder dystocia impedes delivery. However, many cases of brachial plexus injury are not due to shoulder dystocia or excessive force by the provider. Treatment for brachial plexus injuries includes orthosis/splinting, occupational or physical therapy. Surgical intervention has been proposed in select cases if functional recovery does not occur in three to nine months, however there is no consensus regarding the utility or timing of surgery (Duygu, 2022).

Obstetric brachial plexus injury (OBPI) can result in muscle imbalances and contractures about the shoulder, which over time exert forces that may lead to bony deformity and joint problems. Triangle tilt (TT) surgery aims to correct the muscular imbalance and resulting deformity through bony realignment of the clavicle, acromion, and scapula. The surgical technique involves osteotomies of the clavicle and the neck of the acromion, allowing the once anteriorly tilted acromioclavicular triangle to return to a more natural position. This alignment theoretically allows for favorable glenohumeral joint remodeling, thus restoring anatomy, function, and range of motion. Candidates for the surgery generally present with marked internal rotation of the arm and poor supination. The surgery is followed by splinting for 6 weeks, after which the splint is worn only at night for another 3 to 6 months (Nath et al., 2010a).

A procedure termed the "modified Quad" or "Mod Quad" is a secondary surgery intended to correct muscle imbalances in children with brachial plexus injury. The Mod Quad is comprised of four steps: transfer of the latissimus dorsi muscle to allow external rotation and abduction; transfer of the teres major muscle to stabilize the scapula; release of the subscapularis and pectoralis major and minor contractures; and decompression and neurolysis of the axillary nerve. The goal of the procedure is to restoration of shoulder abduction (Nath & Paizi, 2007).

COVERAGE POLICY

Triangle tilt surgery and the Mod Quad procedure for treatment of obstetric brachial plexus injury **are considered experimental, investigational, and unproven** because of insufficient evidence in peer reviewed medical literature.

DOCUMENTATION REQUIREMENTS. Molina Healthcare reserves the right to require that additional documentation be made available as part of its coverage determination; quality improvement; and fraud; waste and abuse prevention processes. Documentation required may include, but is not limited to, patient records, test results and credentials of the provider ordering or performing a drug or service. Molina Healthcare may deny reimbursement or take additional appropriate action if the documentation provided does not support the initial determination that the drugs or services were medically necessary, not investigational or experimental, and otherwise within the scope of benefits afforded to the member, and/or the documentation demonstrates a pattern of billing or other practice that is inappropriate or excessive.

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SUMMARY OF MEDICAL EVIDENCE

There is insufficient published evidence to assess the safety and/or impact on health outcomes or patient management for triangle tilt surgery and the Mod Quad procedure for treatment of obstetric brachial plexus injury. There are no randomized controlled trials, no studies comparing TT surgery with other methods of treating OBPI, nor sufficient information on perioperative or postoperative complications or safety outcomes. Published evidence consists of meta-analysis, prospective, retrospective studies, and case series. A summary of evidence-based studies is below.

The largest prospective comparative study evaluated outcomes in children undergoing TT surgery for OBPI, using the Pediatric Outcomes Data Collection Instrument (PODCI). 130 consecutive patients (62 boys and 68 girls; age range 2 to 10 years) presenting for routine office visits in the Texas Nerve and Paralysis Institute whose parents completed the data survey were included in the study. The study included 63 children who had undergone TT surgery ≥ 1 year previously (TT Surgery group; mean age 6 years) and 67 children who were candidates for TT surgery (Non-TT Surgery group; mean age 5 years). In the TT Surgery group, 48 patients had Erb palsy and 15 had complete palsy. In the Non-TT Surgery group, 49 children had Erb palsy and 18 had complete palsy. After surgery, the TT Surgery group had significantly higher mean scores than the Non-TT Surgery group for upper extremity function (73.2 versus 54.1; $P=0.0033$), sports/physical function (70.8 versus 54.8; $P=0.013$), basic mobility (77.6 versus 50.7; $P<0.0001$), and global functioning (70.36 versus 52.38; $P=0.0048$). Mean scores were higher in the TT Surgery group for improved pain/comfort (66.9 versus 61.3; $P=0.3592$) and happiness (57.7 versus 52.2; $P=0.3514$). Among patients in the Second TT Surgery group, compared with mean preoperative scores, mean postoperative scores increased significantly for upper extremity function (62.0 versus 73.4; $P<0.03$), pain/comfort (80.8 versus 94.8; $P<0.05$), basic mobility (88.0 versus 94.1; $P=0.002$), and global functioning (78.5 versus 85.9; $P<0.03$). The authors commented that the higher mean age in the TT Surgery group may have contributed to better upper extremity function scores. Some improvement with age is expected, regardless of surgical intervention (Nath et al., 2011b).

A retrospective uncontrolled study evaluated 5-year outcomes in children undergoing TT surgery for OBPI. The study included 22 children (13 boys and 9 girls) with OBPI who had completed a mean of 62 months of follow-up. The mean age at surgery was 5.8 years (range 2.1 to 11.8). The site of injury was C5-C6 in 11 patients, C5-C7 in 7, and C5-C8 or C5-T1 in 4. All patients had undergone soft tissue release procedures as well as previous surgeries such as primary nerve surgery, humeral osteotomy, and posterior glenohumeral capsulorrhaphy. Mallet scoring was performed by a trained observer independent of the primary investigator. On modified Mallet scoring, patients demonstrated significant improvements when comparing preoperative scores with postoperative scores: mean external rotation (2.5 versus 4.1 at 5 years; $P<0.0001$), hand-to-neck (2.7 versus 4.3; $P<0.0001$), hand-to-spine (2.5 versus 3.4; $P<0.005$), hand-to-mouth (2.3 versus 4.2; $P<0.0001$), supination (2.6 versus 4.1; $P<0.0001$), and total score (14.1 versus 20.3; $P<0.0001$) (Nath et al., 2013).

Another small retrospective comparative study evaluated outcomes of TT surgery for OBPI in children operated on at < 2 years of age versus those treated at later ages. The study included 36 children. Patients < 2 years of age (Group 1; $n=16$) were treated at a mean age of 18 months (range 9 to 23). Those > 2 years of age (Group 2; $n=20$) were treated at a mean age of 6 years (range 26 months to 9 years). Outcome measures were performed by trained observers independent of the principal investigator at a mean follow-up time of 2.5 years after TT surgery. Mean preoperative to postoperative changes in overall Mallet scores were significantly greater in Group 1 (6.6 versus 3.8; $P=0.0002$), as were mean changes in scores for external rotation (1.5 versus 0.69; $P=0.0029$), hand-to-mouth (2.0 versus 1.0; $P=0.0035$), and supination angle (78° versus 20° ; $P=0.0061$). Children in Group 1 had significantly lower preoperative overall Mallet scores (12.1 versus 13.8; $P=0.003$) and supination angle (-18.4 versus 8.5 ; $P=0.02$). The investigators believe that younger children may have greater potential for anatomical remodeling after TT surgery than older children (Nath et al., 2011a).

Nath and Somasundaram (2019) evaluated the 10-year outcomes of 17 patients who underwent TT and Mod Quad surgery. Outcomes were evaluated using Mallet scoring. Fifteen of the 17 children maintained recovered upper extremity functions for an extended period (mean of 10 years, range 9-13 years). The preoperative mean total Mallet score for the group was 14.5 ± 1.2 , 18.8 at three years post-surgery, and 20.35 at the time of the extended period evaluation. Thus, the authors concluded that not only did overall upper extremity functions improve following the surgeries, but the improvement was also maintained for an extended period and in some cases increased.

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SUPPLEMENTAL INFORMATION

None.

CODING & BILLING INFORMATION

CPT Codes

CPT	Description
23929	Unlisted procedure shoulder
64999	Unlisted procedure, nervous system

HCCPS Codes – N/A

ICD-10 Codes

ICD-10	Description
P14.0	Erb's paralysis due to birth injury
P14.3	Other brachial plexus birth injuries
S14.3	Injury of brachial plexus

CODING DISCLAIMER. Codes listed in this policy are for reference purposes only and may not be all-inclusive. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement. Listing of a service or device code in this policy does not guarantee coverage. Coverage is determined by the benefit document. Molina adheres to Current Procedural Terminology (CPT®), a registered trademark of the American Medical Association (AMA). All CPT codes and descriptions are copyrighted by the AMA; this information is included for informational purposes only. Providers and facilities are expected to utilize industry standard coding practices for all submissions. When improper billing and coding is not followed, Molina has the right to reject/deny the claim and recover claim payment(s). Due to changing industry practices, Molina reserves the right to revise this policy as needed.

APPROVAL HISTORY

04/13/2022	Policy reviewed, updated Summary of Evidence and references.
04/05/2021	Policy reviewed, no changes, updated references – no additional studies located in the peer reviewed literature.
06/17/2020	Policy reviewed, one new small retrospective study identified; procedure remains experimental, investigational and unproven because of insufficient evidence in the peer reviewed medical literature.
12/16/2015, 09/15/2016, 09/19/2017, 07/10/2018, 06/19/2019	Policy reviewed, no changes.
10/14/2014	New policy.

REFERENCES

Government Agency

- Centers for Medicare and Medicaid Services (CMS). Medicare coverage database. Available from [CMS](#). Accessed March 7, 2022.

Evidence Based Reviews and Publications

- Bromberg M. Brachial plexus syndromes. Available from [UpToDate](#). Updated September 23, 2021. Accessed March 7, 2022. Registration and login required.
- Duygu S. Neonatal brachial plexus palsy. Available from [UpToDate](#). Updated January 7, 2022. Accessed March 7, 2022. Registration and login required.
- Hayes. Medical technology brief: Triangle tilt surgery for treatment of obstetric brachial plexus injury. Available from [Hayes](#). Published October 2013. Updated August 2015. Archived. Accessed March 7, 2022. Registration and login required.

Peer Reviewed Publications

- Nath RK, Amrani A, Melcher SE, Eichhorn MG. Triangle tilt surgery in an older pediatric patient with obstetric brachial plexus injury. Eplasty. 2009 Jun 30;9:e26. Available [here](#).
- Nath RK, Amrani A, Melcher SE, et al. Surgical normalization of the shoulder joint in obstetric brachial plexus injury. Ann Plast Surg. 2010a Oct;65(4):411-7. doi: 10.1097/SAP.0b013e3181e1335b.
- Nath RK, Avila MB, Karicherla P, Somasundaram C. Assessment of triangle tilt surgery in children with obstetric brachial plexus injury using the pediatric outcomes data collection instrument. Open Orthop J. 2011bc;5:385-388. Available [here](#).

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5. Nath RK, Karicherla P, Mahmooduddin F. Shoulder function and anatomy in complete obstetric brachial plexus palsy: long-term improvement after triangle tilt surgery. *Childs Nerv Syst*. 2010b;26(8):1009-1019. Available [here](#).
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10. Nath RK, Somasundaram C. Extended long-term (5 years) outcomes of triangle tilt surgery in obstetric brachial plexus injury. *Open Orthop J*. 2013;7:94-98. Available [here](#).
11. Nath RK, Somasundaram C. Improvements after Mod Quad and triangle tilt revision surgical procedures in obstetric brachial plexus palsy. *World J Orthop*. 2016 Nov 18; 7(11): 752–757.
12. Nath RK, Somasundaram C. Triangle tilt and humeral surgery: Meta-analysis of efficacy and functional outcome. *World J Orthop*. 2015 Jan 18;6(1):156-60. doi: 10.5312/wjo.v6.i1.156.
13. Othman M, Sebaei MAF, Abdelwahab AM. The triangle tilt procedure for treatment of secondary shoulder deformities in obstetric brachial plexus injury. *International Journal of Orthopaedics Sciences*. 2018; 4(4): 63-67. doi: <https://doi.org/10.22271/ortho.2018.v4.i4b.14>.

APPENDIX

Reserved for State specific information. Information includes, but is not limited to, State contract language, Medicaid criteria and other mandated criteria.