

Molina Clinical Policy

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

Last Approval: 4/13/2023

Next Review Due By: April 2024



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 injuries are not due to shoulder dystocia or excessive force by the provider. Treatment for brachial plexus injuries includes orthosis or splinting, occupational therapy, or physical therapy. Surgical intervention has been proposed in select cases if functional recovery does not occur in three to nine months, but there is no consensus regarding the utility or timing of surgery (Duygu, 2022).

Obstetric brachial plexus injury (OBPI) can result in muscular imbalances and contractures around the shoulder, which, over time, can exert forces that can lead to bony deformities and joint problems. Triangle tilt (TT) surgery aims to correct the muscular imbalance and resulting deformity by realigning the clavicle, acromion, and scapula. The surgical technique involves clavicle and acromion neck osteotomies, which allow the previously anteriorly tilted acromioclavicular triangle to return to a more natural position. This alignment, in theory, 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 only worn at night for another 3 to 6 months (Nath et al., 2010a).

The "modified Quad" or "Mod Quad" is a secondary surgery intended to correct muscle imbalances in children with brachial plexus injury. The Mod Quad procedure consists 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 procedure aims to restore shoulder abduction (Nath & Paizi, 2007).

COVERAGE POLICY

Triangle tilt surgery and the Mod Quad procedure for the treatment of obstetric brachial plexus injury **are considered experimental, investigational, and unproven** due to 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.

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

Last Approval: 4/13/2023
Next Review Due By: April 2024



SUMMARY OF MEDICAL EVIDENCE

There is insufficient published evidence to assess the safety and/or impact on health outcomes or patient management of triangle tilt surgery and the Mod Quad procedure for the treatment of obstetric brachial plexus injury. There are no randomized controlled trials, no studies comparing TT surgery to other methods of treating OBPI, and there is insufficient information on perioperative or postoperative complications or safety outcomes. Published evidence consists of meta-analysis, prospective, retrospective, and case series studies. A summary of evidence-based studies is outlined below.

The largest prospective comparative study evaluated outcomes in children undergoing TT surgery for OBPI, using the Pediatric Outcomes Data Collection Instrument (PODCI). The study included 130 consecutive patients (62 boys and 68 girls; age range 2 to 10 years) who presented for routine office visits in the Texas Nerve and Paralysis Institute and whose parents completed the data survey. The study included 63 children who had undergone TT surgery \geq 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). There were 48 Erb palsies and 15 complete palsies in the TT Surgery group. There were 49 children with Erb palsy and 18 with complete palsy in the Non-TT Surgery group. 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; $P=0.0048$) were significantly higher in the TT Surgery group than in the Non-TT Surgery group after surgery. Mean scores for improved pain/comfort (66.9 versus 61.3; $P=0.3592$) and happiness (57.7 versus 52.2; $P=0.3514$) were higher in the TT Surgery group. In the Second TT Surgery group, mean postoperative scores 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; $P<0.03$) increased significantly when compared to mean preoperative scores. The authors noted 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 of children who had 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 osteotomies, 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), hand-to-neck (2.7 versus 4.3), hand-to-spine (2.5 versus 3.4), hand-to-mouth (2.3 versus 4.2), supination (2.6 versus 4.1), and total modified Mallet functional score (14.1 versus 20.3) were significantly improved ($p<0.0001$), and maintained over the extended long-term (5 years) (Nath et al., 2013).

Another small retrospective comparative study evaluated the 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. The 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 that the improvement was also sustained for an extended period, and in some cases, increased.

Molina Clinical Policy

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

Last Approval: 4/13/2023
Next Review Due By: April 2024



CODING & BILLING INFORMATION

CPT Codes

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

HCPCS Codes – N/A

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

4/13/2023	Policy reviewed. No changes in coverage position. Updated references.
4/13/2022	Policy reviewed. Updated Summary of Evidence and references.
4/5/2021	Policy reviewed. No changes. Updated references – no additional studies located in the peer-reviewed literature.
6/17/2020	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	Policy reviewed, no changes.
9/15/2016	Policy reviewed, no changes.
9/19/2017	Policy reviewed, no changes.
7/10/2018	Policy reviewed, no changes.
6/19/2019	Policy reviewed, no changes.
10/14/2014	New policy.

REFERENCES

Government Agency

- Centers for Medicare and Medicaid Services (CMS). Medicare coverage database. Accessed February 2023. <http://www.cms.gov/mcd/search.asp>.

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.
- 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.
- Nath RK, Avila MB, Karicherla P. Triangle tilt surgery as salvage procedure for failed shoulder surgery in obstetric brachial plexus injury. *Pediatr Surg Int*. 2010d;26(9):913-918. doi: 10.1007/s00383-010-2673-7. Epub 2010 Jul 29.
- 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 doi: 10.1007/s00381-010-1174-2. Epub 2010 May 16.
- Nath RK, Mahmooduddin F. Triangle tilt surgery: Effect on coracohumeral distance and external rotation of the glenohumeral joint. *Eplasty*. 2010d;10:e67. PMID: 21119773; PMCID: PMC2990465.
- Nath RK, Paizi M. Improvement in abduction of the shoulder after reconstructive soft-tissue procedures in obstetric brachial plexus palsy. *J Bone Joint Surg Br*. 2007 May;89(5):620-6. doi: 10.1302/0301-620X.89B5.18403.
- Nath RK, Somasundaram C, Mahmooduddin F. Comparing functional outcome of triangle tilt surgery performed before versus after two years of age. *Open Orthop J*. 2011a;5:59-62. doi: 10.2174/1874325001105010059.
- Nath RK, Somasundaram C. 10-year follow-up of Mod Quad and triangle tilt surgeries in obstetric brachial plexus injury. *Plast Reconstr Surg Glob Open*. 2019 Jan 22;7(1):e1998. doi: 10.1097/GOX.0000000000001998.
- 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. doi: 10.2174/1874325001307010094.
- 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. doi: 10.5312/wjo.v7.i11.752.

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



Last Approval: 4/13/2023

Next Review Due By: April 2024

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>.

Other Authoritative Publications

1. Bromberg M. Brachial plexus syndromes. Updated September 23, 2021. Accessed February 2023. <http://www.uptodate.com>.
2. Duygu S. Neonatal brachial plexus palsy. Updated January 3, 2023. Accessed February 2023. <http://www.uptodate.com>.
3. Hayes. Medical technology brief: Triangle tilt surgery for treatment of obstetric brachial plexus injury. Published October 2013. Updated August 2015. Archived. Accessed February 2023. <http://www.hayesinc.com>.