Thermal Capsulorrhaphy as a Treatment of Joint Instability

Policy #  00033
Original Effective Date:  05/12/2003
Current Effective Date:  03/20/2019

Applies to all products administered or underwritten by Blue Cross and Blue Shield of Louisiana and its subsidiary, HMO Louisiana, Inc. (collectively referred to as the “Company”), unless otherwise provided in the applicable contract. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.

Services Are Considered Not Medically Necessary
Based on review of available data, the Company considers thermal capsulorrhaphy as a treatment of joint instability, including, but not limited to the shoulder, knee and elbow, to be not medically necessary.**

Background/Overview
Shoulder instability is a relatively common occurrence, reported in between 2% and 8% of the population. The condition may arise from a single traumatic event (i.e., subluxation or dislocation), repeated microtrauma, or constitutional ligamentous laxity, resulting in deformation and/or damage in the glenohumeral capsule and ligaments. Shoulder instability may be categorized according to the movement of the humeral head (i.e., either anterior, posterior, inferior, or multidirectional instability). Multidirectional instability most frequently consists of anterior and inferior subluxation or dislocation. Inferior movement is also classified as multidirectional.

Initial treatment of shoulder subluxation or dislocation is conservative in nature followed by range-of-motion and strengthening exercises. However, if instability persists, either activity modifications or surgical treatment may be considered. Activity modification may be appropriate for patients who can identify a single motion that aggravates instability, such as overhead throwing motions. Surgical treatment may be considered in those who are unwilling to give up specific activities (i.e., related to sports) or when instability occurs frequently or during daily activities.

Surgery consists of inspection of the shoulder joint with repair, reattachment, or tightening of the labrum, ligaments, or capsule performed either with sutures or sutures attached to absorbable tacks or anchors. While arthroscopic approaches have been investigated over the past decade, their degree of success has been controversial due to a higher rate of recurrent instability compared with open techniques, thought to be related in part to the lack of restoration of capsular tension. Recent reports of arthroscopic techniques have described various suturing techniques for tightening the capsule, which require mastery of technically difficult arthroscopic intra-articular knot-tying.

Thermal capsulorrhaphy has been proposed as a technically simpler arthroscopic technique for tightening the capsule and ligaments. The technique is based on the observation that the use of nonablative levels of radiofrequency thermal energy can alter the collagen in the glenohumeral ligaments and/or capsule, resulting in their shrinkage and a decrease in capsular volume, both thought to restore capsular tension. Thermal capsulorrhaphy may be used in conjunction with arthroscopic repair of torn ligaments or other structures (i.e., repair of Bankart or superior labrum anterior and posterior lesion). In addition, thermal capsulorrhaphy has been investigated as an arthroscopic treatment of glenohumeral laxity, a common injury among overhead athletes, such as baseball players, resulting in internal impingement of the posterior
Thermal Capsulorrhaphy as a Treatment of Joint Instability

Policy # 00033
Original Effective Date: 05/12/2003
Current Effective Date: 03/20/2019

Thermal capsulorrhaphy has been proposed as a sole arthroscopic treatment. For example, the technique may be considered in patients with chronic shoulder pain without recognized instability, based on the theory that the pain may be related to occult or microinstability. This diagnosis may be considered when a diagnostic arthroscopy reveals only lax ligaments and is commonly seen among baseball players. Finally, thermal capsulorrhaphy may be considered in patients with congenital ligamentous laxity, such as Ehlers-Danlos or Marfan syndrome.

While thermal capsulorrhaphy was initially investigated using laser energy, the use of radiofrequency probes is now more commonly employed. Devices include Oratec &© ORA-50 Monopolar RF Generator (Oratec Interventions, Menlo Park, CA) and ArthroCare &© (ArthroCare, Sunnyvale, CA).

FDA or Other Governmental Regulatory Approval
U.S. Food and Drug Administration (FDA)
Thermal capsulorrhaphy is a surgical procedure and, as such, is not subject to regulation by the U.S. FDA. Previously a number of electrosurgical cutting and coagulation devices were cleared for marketing by FDA through the 510(k) process. FDA product code: GEI.

Centers for Medicare and Medicaid Services (CMS)
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

Rationale/Source
Thermal Capsulorrhaphy of the Shoulder
The evidence on thermal capsulorrhaphy of the shoulder is derived from 1 small randomized controlled trial (RCT) several nonrandomized comparative studies, and 2 large case series with midterm follow-up. Reports of adverse events are also reviewed.

Randomized Controlled Trials
In 2006, a Canadian workgroup reported a multicenter RCT that had been recruiting subjects since 1999. Enrollment was slower than anticipated; 19 patients treated with thermal capsulorrhaphy and 15 subjects treated with surgical repair had completed 2-year follow-up as of publication. This trial was completed in February 2010 with an enrollment of 58 patients (see Table 1).

Nonrandomized Comparative Studies
In 2001, Levitz et al reported a study of 82 baseball players undergoing arthroscopic surgery for internal impingement. The first 51 patients underwent traditional arthroscopic surgery, consisting of débridement of tears in the rotator cuff and attachment of labral tears. There was no attempt to reduce the capsular laxity. The next 31 patients underwent traditional arthroscopic surgery and also underwent thermal capsulorrhaphy. The main outcome measure was time to return to competition. Among those who did not undergo thermal capsulorrhaphy, 80% returned to competition at a mean time of 7.2 months, with 67% still...
competing after 30 months. Among those who did undergo thermal capsulorrhaphy, 93% returned to competition at a mean time of 8.4 months, with 90% still competing after 30 months.

In 2000, Savoie and Field compared the outcomes of patients with multidirectional instability who were treated with either thermal capsulorrhaphy (n=30) or arthroscopic capsular shift (i.e., suture repair) (n=26). Additional arthroscopic procedures were performed in both groups, as needed. Two patients treated with thermal capsulorrhaphy had an unsatisfactory outcome compared with 3 patients in the suture repair group.

In 2005, Chen et al reported on 40 patients who underwent combined arthroscopic labral repair and thermal capsulorrhaphy from 1999 to 2002; the results were compared with a historical control group of 32 patients who underwent the same surgery without capsulorrhaphy during 1996 to 1999. There was no difference in outcomes in the 2 groups, leading the authors to conclude that thermal capsulorrhaphy neither improved nor compromised the results of conventional arthroscopic treatment.

In 2001, Levy et al reported on 90 patients (99 shoulders) with shoulder instability treated with thermal capsulorrhaphy using either radiofrequency (34 patients, 38 shoulders) or laser energy (56 patients, 61 shoulders) and followed for means of 23 and 40.5 months, respectively. In the laser-treated group, 59% of the patients considered their shoulder(s) to be “better” or “much better,” the failure rate in this group was 36.1%. In the radiofrequency-treated group, 76.3% of patients felt better or much better; the failure rate was a 23.7%.

Case Series
In 2004, D'Alessandro et al published the results of a prospective study of 84 patients (84 shoulders) who underwent thermal capsulorrhaphy for various indications. With an average follow-up of 38 months, 37% of patients reported unsatisfactory results, based on reports of pain, instability, return to work, and the American Shoulder and Elbow Surgeons Shoulder Assessment score. The authors reported that the high rate of unsatisfactory results was of great concern. Levine et al reported that the initial wave of enthusiasm for thermal capsulorrhaphy has largely subsided, given the negative results reported by in this study.

In 2007, 2- to 6-year follow-up was reported on 85 of 100 consecutive patients treated with thermal capsulorrhaphy for glenohumeral instability. Thirty-seven patients (43.5%) were considered to have had a failed procedure, defined as recurrent instability, revision of surgery, and recalcitrant pain or stiffness requiring manipulation. Deterioration of efficacy over time was reported from a series of 12 overhead athletes (volleyball, tennis, baseball, swimming) who presented with internal impingement at an average age of 27 years (range, 23-34 years). At 2 years after surgery, average modified Rowe score had increased from 45.8 to 90.4; at 7 years postoperatively, the Rowe score had decreased to 70.4 and visual analog scale score for pain was 4.8. At 7 years, 25% of athletes reported that they had returned to their preinjury level of competition, 25% played at a lower level, and 50% had stopped because of their shoulder pain.
Thermal Capsulorrhaphy as a Treatment of Joint Instability

Policy # 00033
Original Effective Date: 05/12/2003
Current Effective Date: 03/20/2019

Other Joints
Literature on thermal capsulorrhaphy for joints other than the shoulder is limited. One small case series (13 patients) from 2007 reported use of thermal capsulorrhaphy for palmar midcarpal instability. A 2008 publication describes thermal capsulorrhaphy for the parapatellar capsule as controversial.

Adverse Events
In 2007, Good et al conducted a retrospective chart review on patients who had been referred for shoulder stiffness and had developed glenohumeral chondrolysis. Of the 8 patients who had developed glenohumeral chondrolysis after shoulder arthroscopy, 5 had undergone thermal capsulorrhaphy for shoulder instability, and 3 had a thermal procedure with labral repair or synovectomy. The onset was described as early and rapid, with repeat arthroscopy to confirm the diagnosis of chondrolysis and rule out infection at an average of 8 months after the initial shoulder arthroscopy. The mean age of the patients was 23 years (range, 15-39 years). None of the patients had evidence of chondral damage at the index arthroscopy, and none had received postoperative intra-articular pain pumps, a procedure which has also been associated with chondrolysis. The patients required between 1 and 6 procedures after the onset of chondrolysis to manage their pain, including glenoid allograft, humeral head arthroplasty, and total shoulder arthroplasty. Good et al identified an additional 10 reported cases of glenohumeral chondrolysis following shoulder arthroscopy in the English-language literature. Five of the 10 cases occurred after the use of gentian violet dye injection into the joint to identify a rotator cuff tear; this technique has since been abandoned. Of the remaining 5 reported cases, 4 involved the use of a thermal device during the procedure. An accompanying editorial by the journal's editors concluded that “…pending evidence to the contrary, shoulder thermal capsulorrhaphy is a procedure in which these and other reported risks outweigh any potential benefits.”

A 2010 review of shoulder instability in patients with joint hyperlaxity indicates that although initial results with thermal capsulorrhaphy seemed promising, subsequent studies with longer follow-up showed “…unacceptably high failure rates and postoperative complications…” including cases of postoperative axillary nerve palsy and transient deltoid weakness. Abnormal capsular tissue has also been observed in the areas of previous thermal treatment, with either severe thickening or thin, friable deficient capsule. In a 2011 review, Virk and Kocher described thermal capsulorrhaphy as a failed new technology in sports medicine.

Ongoing and Unpublished Clinical Trials
Some currently unpublished trials that might influence this review are listed in Table 1.

Table 1. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpublished</td>
<td>Electrothermal Arthroscopic Capsulorrhaphy (ETAC) and Open Inferior Capsular Shift in Patients With Shoulder Instability</td>
<td>58</td>
<td>Feb 2010</td>
</tr>
</tbody>
</table>

©2019 Blue Cross and Blue Shield of Louisiana

Blue Cross and Blue Shield of Louisiana is an independent licensee of the Blue Cross and Blue Shield Association and incorporated as Louisiana Health Service & Indemnity Company.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without permission from Blue Cross and Blue Shield of Louisiana.
Thermal Capsulorrhaphy as a Treatment of Joint Instability

Policy #: 00033
Original Effective Date: 05/12/2003
Current Effective Date: 03/20/2019

NCT: national clinical trial.
* Denotes industry-sponsored or cosponsored trial.

Summary of Evidence
The literature does not support use of thermal capsulorrhaphy. The few available comparative studies do not support that this procedure is an efficacious treatment for shoulder instability. The case series report a high rate of unsatisfactory results and complications, raising the potential for a net harm. Because of the lack of efficacy and potential for harm, this procedure is considered not medically necessary.

References
16. Lubowitz JH, Poehling GG. Glenohumeral thermal capsulorrhaphy is not recommended--shoulder chondrolysis requires additional research [editorial]. Arthroscopy. Jul 2007;23(7):687. PMID 17637401

©2019 Blue Cross and Blue Shield of Louisiana

Blue Cross and Blue Shield of Louisiana is an independent licensee of the Blue Cross and Blue Shield Association and incorporated as Louisiana Health Service & Indemnity Company.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without permission from Blue Cross and Blue Shield of Louisiana.
Thermal Capsulorrhaphy as a Treatment of Joint Instability

**Policy #** 00033  
**Original Effective Date:** 05/12/2003  
**Current Effective Date:** 03/20/2019

### Policy History

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/25/2003</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>05/12/2003</td>
<td>Managed Care Advisory Council approval</td>
</tr>
<tr>
<td>05/03/2005</td>
<td>Medical Director review</td>
</tr>
<tr>
<td>05/17/2005</td>
<td>Medical Policy Committee review. Format revision. Rationale/ source added. Policy statement expanded from; &quot;electrothermal arthroscopy is investigational&quot; to, &quot;as a treatment of joint instability, including, but not limited to the shoulder, knee and elbow&quot;</td>
</tr>
<tr>
<td>05/23/2005</td>
<td>Managed Care Advisory Council approval</td>
</tr>
<tr>
<td>07/07/2006</td>
<td>Format revision, including addition of FDA and or other governmental regulatory approval and rationale/source. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>04/04/2007</td>
<td>Medical Director review</td>
</tr>
<tr>
<td>04/18/2007</td>
<td>Medical Policy Committee approval. Name changed from Electrothermal Arthroscopy to Thermal Capsulorrhaphy as a Treatment of Joint Instability to match Blue Cross Blue Shield Association. No change to coverage eligibility.</td>
</tr>
<tr>
<td>03/04/2009</td>
<td>Medical Director review</td>
</tr>
<tr>
<td>03/18/2009</td>
<td>Medical Policy Committee approval. No change to coverage eligibility.</td>
</tr>
<tr>
<td>03/05/2010</td>
<td>Medical Director review</td>
</tr>
<tr>
<td>03/19/2010</td>
<td>Medical Policy Committee approval. No change to coverage eligibility.</td>
</tr>
<tr>
<td>03/03/2011</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/16/2011</td>
<td>Medical Policy Implementation Committee approval. Coverage changed from investigational to not medically necessary.</td>
</tr>
<tr>
<td>03/01/2012</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/21/2012</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>03/07/2013</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/20/2013</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>03/06/2014</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/19/2014</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>03/05/2015</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/20/2015</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>08/03/2015</td>
<td>Coding update: ICD10 Diagnosis code section added; ICD9 Procedure code section removed.</td>
</tr>
<tr>
<td>03/03/2016</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/16/2016</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>01/01/2017</td>
<td>Coding update: Removing ICD-9 Diagnosis Codes</td>
</tr>
<tr>
<td>03/02/2017</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/15/2017</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>03/01/2018</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/21/2018</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>03/07/2019</td>
<td>Medical Policy Committee review</td>
</tr>
<tr>
<td>03/20/2019</td>
<td>Medical Policy Implementation Committee approval. Coverage eligibility unchanged.</td>
</tr>
<tr>
<td>Next Scheduled Review Date:</td>
<td>03/2020</td>
</tr>
</tbody>
</table>
Thermal Capsulorrhaphy as a Treatment of Joint Instability

Policy # 00033
Original Effective Date: 05/12/2003
Current Effective Date: 03/20/2019

Coding
The five character codes included in the Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines are obtained from Current Procedural Terminology (CPT®), copyright 2018 by the American Medical Association (AMA). CPT is developed by the AMA as a listing of descriptive terms and five character identifying codes and modifiers for reporting medical services and procedures performed by physician.

The responsibility for the content of Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines is with Blue Cross and Blue Shield of Louisiana and no endorsement by the AMA is intended or should be implied. The AMA disclaims responsibility for any consequences or liability attributable or related to any use, nonuse or interpretation of information contained in Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines. Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein. Any use of CPT outside of Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines should refer to the most current Current Procedural Terminology which contains the complete and most current listing of CPT codes and descriptive terms. Applicable FARS/DFARS apply.

CPT is a registered trademark of the American Medical Association.

Codes used to identify services associated with this policy may include (but may not be limited to) the following:

<table>
<thead>
<tr>
<th>Code Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT</td>
<td>29999</td>
</tr>
<tr>
<td>HCPCS</td>
<td>S2300</td>
</tr>
<tr>
<td>ICD-10 Diagnosis</td>
<td>All related diagnoses</td>
</tr>
</tbody>
</table>

**Medically Necessary (or “Medical Necessity") - Health care services, treatment, procedures, equipment, drugs, devices, items or supplies that a Provider, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury, disease or its symptoms, and that are:
A. In accordance with nationally accepted standards of medical practice;
B. Clinically appropriate, in terms of type, frequency, extent, level of care, site and duration, and considered effective for the patient's illness, injury or disease; and
C. Not primarily for the personal comfort or convenience of the patient, physician or other health care provider, and not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient's illness, injury or disease.
For these purposes, “nationally accepted standards of medical practice” means standards that are based on credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community, Physician Specialty Society recommendations and the views of Physicians practicing in relevant clinical areas and any other relevant factors.

‡ Indicated trademarks are the registered trademarks of their respective owners.

NOTICE: Medical Policies are scientific based opinions, provided solely for coverage and informational purposes. Medical Policies should not be construed to suggest that the Company recommends, advocates, requires, encourages, or discourages any particular treatment, procedure, or service, or any particular course of treatment, procedure, or service.