HEALTH PLANS
UNIVERSITY OF UTAH

Medical Policy

Intraosseous Basivertebral Nerve Ablation Procedure (Intracept®)

Policy MP-068

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Reviewed/Revised Date: 06/23/2021

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Current Effective Date: 08/23/2021

Disclaimer:

1. Policies are subject to change in accordance with State and Federal notice requirements.
2. Policies outline coverage determinations for U of U Health Plans Commercial, and Healthy U (Medicaid) plans. Refer to the "Policy" section for more information.

Description:

Chronic low back pain (CLBP) is defined as persistent pain in the lumbar region lasting for more than 12 weeks. CLBP has many different causes. One suggested cause is vertebrogenic CLBP, which is thought to be associated with degeneration of the vertebral body or vertebral body endplates, which results in inflammation. The inflammatory response is perceived by the basivertebral nerve, a sensory nerve that enters the posterior vertebral body and branches out to the superior and inferior endplates. Pain signals are then transmitted to the central nervous system, causing vertebrogenic pain.

Basivertebral nerve ablation (BVN), such as with the Intracept System (Relievant Medsystems Inc.), is intended to relieve chronic low back pain (CLBP) thought to be due to vertebrogenic causes by inhibiting the transmission of pain signals.

The Intracept® Procedure is a minimally invasive outpatient procedure that targets the basivertebral nerve (BVN) for relief of chronic low back pain caused by vertebrogenic pain between L3 and S1. It consists of the Intracept Introducer Cannula, the Intracept Curved Cannula, the Intracept Radiofrequency Probe, and the Intracept Radiofrequency Generator. According to Relievant Medsystems Inc., the cannula is inserted via minimally invasive procedure under fluoroscopic guidance through the pedicle using a transpedicular approach. The procedure is performed under at least moderate conscious sedation. Fluoroscopic imaging is utilized to guide transpedicular positioning of the intervertebral instruments. After reaching the location of the BVN trunk a flexible bipolar radiofrequency (RF) probe is inserted and then connected to a RF generator to heat the tip to 85 C for 15 minutes. This energy creates a 1 cm diameter spherical ablation zone. The procedure is repeated at each additional vertebral body identified pre-operatively. The minimally invasive procedure can be performed in the outpatient setting.

Policy Statement and Criteria

1. Commercial Plans

U of U Health Plans does NOT cover intraosseous radiofrequency basivertebral nerve ablation (Intracept® procedure) for any indication as it is considered experimental/ investigational/unproven.

2. Medicaid Plans

Coverage is determined by the State of Utah Medicaid program; if Utah State Medicaid has no published coverage position and InterQual criteria are not available, the U of U Health Plans Commercial criteria will apply. For the most up-to-date Medicaid policies and coverage, please visit their website at: http://health.utah.gov/medicaid/manuals/directory.php or the Utah Medicaid code Look-Up tool

3. Medicare Plans

Coverage is determined by the Centers for Medicare and Medicaid Services (CMS); if a coverage determination has not been adopted by CMS and InterQual criteria are not available, the U of U Health Plans Commercial criteria will apply. For the most up-to-date Medicare policies and coverage, please visit their search website at: http://www.cms.gov/medicare-coverage-database/overview-and-quick-search.aspx?from2=search1.asp& or the manual website

Clinical Rationale

Radiofrequency ablation of intraosseous nerves is an emerging technology intended for treatment of chronic low back pain (CLBP). Researchers contend the nerves may be a source of intraosseous back pain and that interruption of the nerve pathway using radiofrequency will relieve the associated pain. It has been purported that the basivertebral nerve transmits pain signals from the vertebral body to the central nervous system. One device was currently 510(k) cleared by the FDA in 2016 for use in clinical settings, the INTRACEPT® System (Relievant MedSystems, Inc, Redwood City, CA) for use as a minimally invasive radiofrequency system for treatment of chronic lumbar back pain at one or more levels (i.e., L3 to S1), when back pain is present despite at least six months of conservative care and is accompanied by either Type I or Type 2 Modic changes on MRI.

Evidence in the peer-reviewed scientific literature evaluating basivertebral nerve ablation consists of a pilot study, two RCTs (one comparing Intracept to sham treatment, one comparing Intracept to conservative treatment), retrospective and prospective case series. Fischgrund and colleagues published the results of three and twelve month outcomes from a RCT comparing Intracept (n=147) with sham treatment (n=78), as part of the FDA IDE trial (SMART Trial). Inclusion criteria consisted of chronic ow back pain for at least six months, nonresponsive to at least six months of conservative treatment, and Modic type I or 2 changes at the vertebral endplate of the level targeted for treatment. Outcomes were measured at 2 and 6 weeks, and at 3, 6, 12, 18 and 24 months postoperative. At 12 months subjects randomized to the sham group were able to crossover to the treatment group. The authors noted due to a high crossover rate (57/78 subjects in the sham group crossed over at 12 months) the subjects

treated with RF ablation acted as their own control for 24 month outcomes. ODI scores at three months demonstrated the treatment group had a 20.5 least squares mean improvement vs. 15.2 in the sham group. Using a 10 point improvement in ODI to define "clinically meaningful improvement" in the treatment group 75.6% were successful at 3 mos. and at 24 mos. 76.4% (81/106 subjects) were successful. The authors noted due to a high crossover rate the subjects treated with RF ablation acted as their own control for 24 month outcomes. The authors acknowledged a 17% per protocol patient fallout by month 24 (n=106). The results of these subjects at 24 months were compared to the overall treated population at baseline (n=128) and at 12 months to avoid unintentional bias. Clinical improvements in ODI, VAS, and the Medical Outcomes Trust Short Form Health Survey were statistically significant at all-time points during the two years. The mean percent improvements in ODI and VAS compared to baseline at two years were 53.7 and 52.9%, respectively. In the authors' opinion, RF ablation of the basivertebral nerve exhibited sustained clinical benefit in ODI and VAS scores for treatment of chronic low back pain. However, limitations of the trial include short term outcomes and a large placebo response to sham treatment causing conclusiveness to the authors' findings to be insufficient.

(Fischgrund, et al., 2018; Fischgrund, et al., 2019) Khalil et al. (2019) publish a second RCT comparing basivertebral nerve ablation to standard care for treatment of chronic low back pain. Inclusion criteria consisted of individuals with chronic pain, isolated to the back for at least 6 months, failure of 6 months of non-operative care, Type I or II Modic changes, and minimum ODI and VAS score of 30 and 4cm, respectively. Primary outcome measures included ODI at baseline, 3, 6, 9, and 12-months post procedure. A 10 point VAS for low back pain, ODI and VAS responder rates, SF-36, and EQ-5D-5L were used as secondary outcome measures. The primary endpoint was a between-arm comparison of the mean change in ODI from baseline to 3 months post-treatment. An interim analysis to determine superiority was conducted when at least 60% of the patients had completed the 3 month primary endpoint visit. Treatment of up to four vertebrae in nonconsecutive levels from L3 to S1 was allowed using the Intracept System; standard care treatment included but was not limited to acupuncture, chiropractic treatment, physical therapy exercise, and spinal injections. The authors reported that at the interim analysis at 3 months showed statistical superiority for all primary and secondary patient reported outcomes in the treatment group (n=51) compared with the standard care group (n=53). As a result, the study enrollment was halted and an early crossover was allowed to the control arm. Twenty-two total adverse events were reported; 15 were reported in 13 of the subjects treated with ablation, seven were procedure related and resulted di back pain of a new location, and either leg pain or paresthesia. Again, limitations of the study included non-structured standard care among subjects, short term outcomes, and as noted by the authors inability to generalize results due to the strict clinical criteria for chronic low back pain.

More recently, Fischgrund et al. (2020) published the five year results from the treatment arm of their multicenter, prospective RCT evaluating intraosseous basivertebral nerve ablation for chronic low back pain. (SMART Trial). Patient reported outcomes of ODI, VAS, post ablation treatments, and patient satisfaction were reported, mean change in ODI was the primary outcome. This study includes the outcomes of 117/133 subjects within the United States centers, 117 subjects were adjudicated as successful for targeting. Subjects in the global population from the original trial were not included. Only 100 subjects were available for final follow up. Long term results for ODI, VAS improvement and responder rates were statistically significant post treatment; ODI was reduced on average by 25.95 ± 18.54 ($p< 0.001$), VAS was 4.38 ± 2.35 ($p< 0.001$), and responder rate using a 15 point improvement in ODI for a successful response was 77% at 5 years following ablation ($p< 0.001$). Using a two point improvement in VAS for a successful response 88% reported a successful response ($p< 0.001$). Improvement in function and pain level seen at one and two year post treatment were sustained at five

years and beyond. The authors also reported a 73% reduction in opioid use from baseline at five years, a 55% reduction in subjects who received an injection in the prior 12 months when compared to baseline, and that there were no patient reported complications. In addition to limitations of the initial trial (e.g., large placebo effect) limitations of this continued trial includes loss of the control group from the initial trial, lack of outcomes from the global population, and industry funding.

In 2020 the International Society for the Advancement of Spine Surgery published a guideline "Intraosseous ablation of the basivertebral nerve for relief of chronic low back pain". Evidence reviewed by the authors included a pilot study, a case series, a multicenter, prospective, parallel RCT (INTRACEPT Study), and the FDA IDE trial (SMART Trial, [12 and 24 month outcomes]). ISASS concluded the technology is supported as a treatment option for a well-defined subset of patients with chronic low back pain. Patient selection criteria defined by ISASS include individuals with all of the following: 1) chronic low back pain for at least 6 months duration, 2) failure to respond to at least 6 months of nonsurgical management, 3) magnetic resonance imaging (MRI) demonstrated Modic 1 changes (MC1) or Modic 2 changes (MC2) in at least 1 vertebral endplate at 1 or more levels from L3 to S1. Within these guidelines however ISASS acknowledges limitations of the evidence include industry funding that may lead to bias, a limited number of studies, short term follow-up (24 months), and an unknown effect on the primary degenerative process.

Further evidence in the form of a post hoc analysis of the Fischgrund trial noted above (Markman, et al, 2019), and observational case series (Becker, et al., 2017; Kim, et al., 2018; Truumees, et al., 2019) have been published and tend to support reduction of opioid use and improvement in pain and function in the short-term. Additional randomized clinical trials evaluating the Intracept system are currently underway (ClinicalTrials.gov database). However, long-term outcomes from well-designed RCTs have yet to be published and patient selection criteria have not been firmly established. At this time, the evidence in the peer reviewed scientific literature remains insufficient to support long term safety and efficacy of RF ablation of the basivertebral nerve as a treatment for chronic back pain.

A 2021 systematic review (Conger et al.) published results on the effectiveness of using intraosseous basivertebral nerve ablation in patients with chronic low back pain and modic changes. Of the 725 publications screened, seven publications with 321 participants were ultimately included. The reported 3-month success rate for ≥50% pain reduction ranged from 45% to 63%. Rates of functional improvement (≥10-point Oswestry Disability Index improvement threshold) ranged from 75% to 93%. For comparison to sham treatment, the relative risk of treatment success defined by ≥50% pain reduction and ≥10-point Oswestry Disability Index improvement was 1.25 (95% confidence interval [CI]: .88-1.77) and 1.38 (95% CI: 1.10-1.73), respectively. For comparison to continued standard care treatment the relative risk of treatment success defined by ≥50% pain reduction and ≥10-point Oswestry Disability Index improvement was 4.16 (95% CI: 2.12-8.14) and 2.32 (95% CI: 1.52-3.55), respectively. There is moderate-quality evidence that suggests this procedure is effective in reducing pain and disability in patients with chronic low back pain who are selected based on type 1 or 2 Modic changes, among other inclusion and exclusion criteria used in the published literature to date. However, success of the procedure appears to be dependent on effective targeting of the basivertebral nerve. The authors concluded that further high-quality, large prospective studies, that are not industry funded, are needed to confirm these findings.

A Hayes Evolving Evidence Review published July 2020 noted minimal support in the clinical studies for the Intracept technology specifically the studies did not consistently or predominantly report clear benefits or advantages in patient-oriented outcomes compared with a comparison group, only 2 studies with a comparison group were identified and the studies were of generally poor or fair quality. This

review noted no systematic reviews identified and also there was also only weak support from clinical guidelines for this technology. Specifically, as it relates to guidelines, it noted the guideline promoted by International Society for the Advancement of Spine Surgery published a guideline is primarily expert opinion and/or lacking a formal evidence evaluation process.

In a 2021 update to the Hayes evolving evidence review above, an updated review of the literature was completed. In this update search (June 23, 2021) 13 studies were reviewed and an additional 1 met inclusion criteria. Some of the records identified in the 2021 update were redundant with those identified in 2020; overlapping search dates were used to ensure no studies were missed due to indexing delays. In summary, the analysis of clinical studies and systematic reviews concluded there is minimal support for using the Intracept Intraosseous Nerve Ablation System for chronic low back pain (CLBP) thought to be of vertebrogenic origin. The report noted clinical studies consistently reported pain relief, improved function and quality of life, however, the studies were generally poor and fair in quality. In addition, only 2 studies were identified with comparison groups where 1 suggested advantages over standard care at up to 6 months follow up and the other did not find clear benefits over sham at 1 year. The 1 systematic review concluded that Intracept is associated with patient's benefits, however, individual studies have quality limitations and it included some studies not included in this report because of poor to fair quality ratings. Furthermore, it was noted the lead author was affiliated with the manufacturer interjecting potential bias into the conclusions. This report also noted professional guidelines provide weak support for this technology. Only 1 guideline was identified as supportive of basivertebral nerve ablation, but does not endorse use of the Intracept system and is primarily expert opinion and/or lacks a formal evidence evaluation process.

Applicable Coding

CPT Codes

22899 Unlisted procedure, spine

HCPCS Codes

C9752 Destruction of intraosseous basivertebral nerve, first two vertebral bodies, including imaging guidance (e.g., fluoroscopy), lumbar/sacrum

C9753 Destruction of intraosseous basivertebral nerve, each additional vertebral body, including imaging guidance (e.g., fluoroscopy), lumbar/sacrum (list separately in addition to code for primary procedure)

References:

1. Conger, A., et al. (2021). "The Effectiveness of Intraosseous Basivertebral Nerve Radiofrequency Neurotomy for the Treatment of Chronic Low Back Pain in Patients with Modic Changes: A Systematic Review." Pain Med **22**(5): 1039-1054.
2. Fischgrund JS, Rhyne A, Franke J, et al. Intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: a prospective randomized double-blind sham-controlled multi-center study. Eur Spine J. 2018 May;27(5):1146-1156. Eur Spine J. 2018 May;27(5):1146-1156.
3. Fischgrund JS, Rhyne A, Franke J, et al. Intraosseous Basivertebral Nerve Ablation for the Treatment of Chronic Low Back Pain: 2-Year Results From a Prospective Randomized Double-Blind Sham-Controlled Multicenter Study. Int J Spine Surg. 2019 Apr 30;13(2):110-119.
4. Fischgrund JS, Rhyne A, Macadaeg K, et al. Long-term outcomes following intraosseous basivertebral nerve ablation for the treatment of chronic low back pain: 5-year treatment arm results from a prospective randomized double-blind sham-controlled multi-center study. Epub, 2020 May 25.
5. Freburger JK, Holmes GM, Agans RP, et al. The rising prevalence of chronic low back pain. Arch Intern Med. 2009;169(3):251-258. Available at: https://doi.org/10.1001/archinternmed.2008.543. Accessed July 2, 2020.

6. Hayes, Inc. (2020) Evolving Evidence Review "Intracept Intraosseous Nerve Ablation System (Relievant Medsystems) for Treatment of Adults with Low Back Pain". Last updated July 9, 2020. Accessed May 25, 2021. Available at: https://evidence.hayesinc.com/report/eer.intraceptlbp4481
7. Hayes, Inc. (2021) Evolving Evidence Review "Intracept Intraosseous Nerve Ablation System (Relievant Medsystems) for Treatment of Adults with Low Back Pain". Last updated July 30, 2021. Accessed August 3, 2021. Available at: https://evidence.hayesinc.com/report/eer.intraceptlbp4481
8. Khalil JG, Smuck M, Koreckij T, et al. A prospective, randomized, multicenter study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain. Spine J. 2019 Jun 20. pii: S1529- 9430(19)30800-9. (Article in Press 8/19/2019).
9. Kim HS, Adsul N, Yudoyono F, et al. Transforaminal Epiduroscopic Basivertebral Nerve Laser Ablation for Chronic Low Back Pain Associated with Modic Changes: A Preliminary Open-Label Study. Pain Res Manag. 2018 Aug 14;2018:6857983.
10. Lorio, M., et al. (2020). "International Society for the Advancement of Spine Surgery Guideline-Intraosseous Ablation of the Basivertebral Nerve for the Relief of Chronic Low Back Pain." Int J Spine Surg 14(1): 18-25. Accessed May 25, 2021. Available at: http://www.ijssurgery.com/content/14/1/18
11. Markman JD, Rhyne AL, Sasso RC, et al. Association between opioid use and patient-reported outcomes in a randomized trial evaluating basivertebral nerve ablation for the relief of chronic low back pain. Neurosurgery. 2020;86(3):343-347.
12. Truumees E, Macadaeg K, Pena E., et al. A prospective, open-label, single-arm, multi-center study of intraosseous basivertebral nerve ablation for the treatment of chronic low back pain. Eur Spine J. 2019 May 21.
13. U.S. Food and Drug Administration. Intercept Intraosseous Nerve Ablation System. 510(k) approval K153272. Accessed May 25, 2021. Available at URL address: https://www.accessdata.fda.gov/cdrh_docs/pdf15/k153272.pdf