

Medical Policy



Title: **Injectable Bulking Agents for the Treatment of Urinary and Fecal Incontinence**

<i>Related Policies:</i>	<ul style="list-style-type: none"> ▪ <i>Periureteral Bulking Agents as a Treatment of Vesicoureteral Reflux (VUR)</i> ▪ <i>Sacral Nerve Neuromodulation/Stimulation</i>
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Populations	Interventions	Comparators	Outcomes
Individuals: <ul style="list-style-type: none"> • With stress urinary incontinence and have failed 	Interventions of interest are: <ul style="list-style-type: none"> • Injectable bulking agents 	Comparators of interest are: <ul style="list-style-type: none"> • Conservative therapy • Other injectable bulking agents 	Relevant outcomes include: <ul style="list-style-type: none"> • Symptoms • Functional outcomes • Quality of life

Populations	Interventions	Comparators	Outcomes
appropriate conservative therapy		• Surgery	• Treatment-related morbidity
Individuals: • With fecal incontinence	Interventions of interest are: • Injectable bulking agents	Comparators of interest are: • Conservative therapy • Sacral nerve stimulation • Surgery	Relevant outcomes include: • Symptoms • Functional outcomes • Quality of life • Treatment-related morbidity

DESCRIPTION

Bulking agents are injectable substances used to increase tissue bulk. They can be injected periurethral to treat urinary incontinence and perianal to treat fecal incontinence. The U.S. Food and Drug Administration (FDA) has approved several bulking agent products for treating urinary incontinence and 1 for treating fecal incontinence.

OBJECTIVE

The objective of this evidence review is to determine whether injectable bulking agents improve the net health outcome for individuals with stress urinary incontinence or fecal incontinence.

BACKGROUND

Incontinence

Incontinence, especially urinary, is a common condition and can have a substantial impact on quality of life. Estimates from the National Center for Health Statistics have suggested that, among noninstitutionalized persons 65 years of age and older, 44% have reported issues with urinary incontinence and 17% issues with fecal incontinence.¹

TREATMENT

Urinary Incontinence

Injectable bulking agents are space-filling substances used to increase tissue bulk. When used to treat stress urinary incontinence (SUI), bulking agents are injected periurethral to increase tissue bulk and thereby increase resistance to the outflow of urine. The bulking agent is injected into the periurethral tissue as a liquid that solidifies into a spongy material to bulk the urethral wall. Bulking agents may be injected over a course of several treatments until the desired effect is achieved. Periurethral bulking agents have been widely used for incontinence in women. Men have also been treated, typically those with postprostatectomy incontinence.

After the success of periurethral bulking agents for treating SUI, bulking agents injected into the anal canal have been proposed to treat fecal incontinence. In particular, bulking agents are a potential treatment for passive fecal incontinence associated with internal anal sphincter dysfunction. The bulking agent is injected into the submucosa of the anal canal to increase tissue bulk in the area, which narrows the opening of the anus. Current treatment options for fecal incontinence include conservative measures (e.g., dietary changes, pharmacotherapy,

pelvic floor muscle exercises), sacral nerve stimulation, and surgical interventions to correct an underlying problem.

Key factors in determining the optimal product are biocompatibility, durability, and absence of migration. A number of periurethral bulking agents to treat urinary incontinence have been cleared for marketing by the U.S. Food and Drug Administration (FDA); however, products developed to date have not necessarily met all criteria of the ideal bulking agents. The first FDA approved product was cross-linked collagen (e.g., Contigen). The agent was found to be absorbed over time and symptoms could recur, requiring additional injections. Contigen production was discontinued in 2011. Other periurethral bulking agents cleared by FDA for urinary incontinence include carbon-coated beads (e.g., Durasphere), spherical particles of calcium hydroxylapatite (CaHA®) in a gel carrier (Coaptite®), polydimethylsiloxane (silicone, Macroplastique®), cross-linked polyacrylamide hydrogel (Bulkamid®), and ethylene vinyl alcohol copolymer implants (e.g., Tegress®, formerly Uryx®). Tegress was voluntarily removed from the market due to safety concerns.

Fecal Incontinence

Several agents identical or similar to those used for urinary incontinence (e.g., Durasphere, silicone biomaterial) have been studied for the treatment of fecal incontinence. To date, only 1 bulking agent has been approved by FDA for fecal incontinence. This formulation is a non-animal-stabilized hyaluronic acid/dextranomer in stabilized hyaluronic acid (NASHA Dx), marketed by Q-Med as Solesta. A hyaluronic acid/dextranomer formulation (Deflux™) from the same company has been commercially available for a number of years for the treatment of vesicoureteral reflux in children

Autologous fat and autologous ear chondrocytes have also been used as periurethral bulking agents; autologous substances do not require FDA approval. Polytetrafluoroethylene (Teflon®) has been investigated as an implant material but does not have FDA approval. A more recently explored alternative is cellular therapy with myoblasts, fibroblasts, or stem cells (muscle-derived or adipose-derived). In addition to their use as periurethral bulking agents, it has been hypothesized that transplanted stem cells would undergo self-renewal and multipotent differentiation, which could result in regeneration of the sphincter and its neural connections.

REGULATORY STATUS

Several periurethral bulking agents have been approved by FDA through the premarket approval process for the treatment of SUI due to intrinsic sphincter deficiency; other than Contigen®, approval is only for use in adult women. Products include:

- In 1993, Contigen (Allergan), a cross-linked collagen, was approved. A supplemental approval in 2009 limited the device's indication to the treatment of urinary incontinence due to intrinsic sphincter deficiency in patients (men or women) who have shown no improvement in incontinence for at least 12 months. Allergan ceased production in 2011; no reason for discontinuation was provided publicly.
- In 1999, Durasphere (Advanced UroScience), a pyrolytic carbon-coated zirconium oxide sphere, was approved.

- In 2004, Uryx (CR Bard), a vinyl alcohol copolymer implant, was approved. In 2005, approval was given to market the device under the name Tegress. In 2007, Tegress® was voluntarily removed from the market due to safety concerns.
- In 2005, Coaptite (Merz Aesthetics, previously BioForm Medical), spherical particles of calcium hydroxylapatite, suspended in a gel carrier, was approved.
- In 2006, Macroplastique (Cogentix Medical), polydimethylsiloxane, was approved.
- In 2020, Bulkamid Urethral Bulking System (Axonics Modulation Technologies, Inc.), a soft hydrogel that consists of 97.5% water and 2.5% polyacrylamide, was approved

In 2011, NASHA Dx, marketed as Solesta (Q-Med), was approved by FDA through the premarket approval process as a bulking agent to treat fecal incontinence in patients 18 years and older who have failed conservative therapy. FDA product code: LNM.

POLICY

- A. The use of carbon-coated spheres, calcium hydroxylapatite, polyacrylamide hydrogel, or polydimethylsiloxane may be considered **medically necessary** to treat stress urinary incontinence in individuals who have failed appropriate conservative therapy.
- B. The use of autologous cellular therapy (e.g., myoblasts, fibroblasts, muscle-derived stem cells, or adipose-derived stem cells), autologous fat, and autologous ear chondrocytes to treat stress urinary incontinence is considered **experimental / investigational**.
- C. The use of any other periurethral bulking agent, including, but not limited to, Teflon, to treat stress urinary incontinence is considered **experimental / investigational**.
- D. The use of periurethral bulking agents to treat urge urinary incontinence is considered **experimental / investigational**.
- E. The use of perianal bulking agents to treat fecal incontinence is considered **experimental / investigational**.

POLICY GUIDELINES

Patients should have had an inadequate response to conservative therapy or therapies; in general, these treatments should have been used for at least 3 months. Conservative therapy for stress incontinence includes pelvic floor muscle exercises and behavioral changes, such as fluid management and moderation of physical activities that provoke incontinence. Additional options include intravaginal estrogen therapy, use of a pessary, and treatment of other underlying causes of incontinence in patients amenable to these treatments.

Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

RATIONALE

The evidence review has been updated regularly with searches of the PubMed database. The most recent literature update was performed through August 29, 2021.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function-including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent 1 or more intended clinical use of the technology in the

intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

STRESS URINARY INCONTINENCE

Clinical Context and Therapy Purpose

The purpose of injectable bulking agents in patients who have stress urinary incontinence (SUI) is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does the use of injectable bulking agents improve the net health outcome in patients with SUI?

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is patients with SUI.

Intervention

The therapy being considered is injectable bulking agents.

Comparators

The following therapies are currently being used to make decisions about SUI: conservative therapy, other injectable bulking agents, and surgery.

Although Contigen is no longer commercially available, it continues to be a common and acceptable comparator for subsequently developed injectable bulking agents. Previously, a clinical practice guideline (1996) for urinary continence in adults concluded that periurethral collagen is curative in 32% of men and 62% of women.² Additionally, an RCT by Corcos et al (2005)³ compared the efficacy of collagen injections with surgery in 133 women and found 12-month success rates for collagen treatment (53%) were lower than for surgery (72%), but the collagen-treated group had significantly fewer adverse events (36% vs 63%, respectively).

Outcomes

The general outcomes of interest are symptom reduction, symptom recurrence, and treatment-related adverse events (e.g., pain, infection). Bulking agents may or may not be curative, and follow-up injections may be necessary within 6 months. Beneficial effects may last between 3 and 12 months

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

REVIEW OF EVIDENCE

Systematic Reviews

Hoe et al (2021) completed a systematic review that compared the efficacy and safety of all urethral bulking agents for the treatment of women with SUI.⁴ The review included 56 articles. Since there was substantial heterogeneity of patient cohorts across studies and variability in outcomes reported, only a qualitative data analysis was performed. Overall, the authors concluded that the data support the use of Bulkamid and Macroplastique for the treatment of SUI with a short-term efficacy of 30% to 90% and 40% to 85%, respectively. Long-term efficacy for these bulking agents is 42% to 70% and 21% to 80%, respectively. Of all available bulking agents, Bulkamid appears to have the more favorable safety profile, with no cases of erosion or migration associated with its use. Of note, direct comparisons of the urethral bulking agents have not been performed.

Pivazyan et al (2021) assessed the efficacy and safety of bulking agents compared to surgical methods for the management of women with SUI, with 6 studies included in the final analysis.⁵ The included studies (N=710) had 288 women receiving a urethral bulking agent and 317 undergoing a surgical procedure (e.g., midurethral sling, retropubic tape, tension-free vaginal tape). Results revealed bulking agents to be less effective than surgical procedures with regard to subjective improvement after treatment (risk ratio: 0.70; 95% confidence interval [CI], 0.53 to 0.92, $p=.01$) with no difference between the 2 interventions regarding post-intervention complications (risk ratio: 1.30; 95% CI, 0.30 to 5.66; $p=.73$).

A Cochrane review by Kirchin et al (2017) evaluating periurethral bulking agents for urinary incontinence in women identified 14 RCTs (sample ranges, 30 to 355 patients) that included bulking agents in at least 1 study arm.⁶ This review updated a 2012 review.⁷ All trials included women with a urodynamic diagnosis of stress incontinence, and 7 trials limited eligibility to stress incontinence due to intrinsic sphincter deficiency. The trials varied by types of bulking agent and comparator interventions used. Eight studies compared 2 bulking agents, 2 compared bulking agents with surgery, 1 compared a bulking agent with pelvic floor exercise, and 1 used a placebo comparison group. Several studies required that women had experienced incontinence for a specified period of time (e.g., 6 or 12 months) and/or had already used conservative therapy; 1 study further specified that conservative therapy had to have been used for at least 3 months. Reviewers determined that the data were unsuitable for pooling due to heterogeneity across trials. They concluded that there was insufficient evidence to guide practice and recommended that additional RCTs with a placebo group or conservative treatment arm be conducted.

A systematic review by Davila (2011) identified 20 studies meeting inclusion criteria (prospective clinical studies or RCTs conducted among women with SUI and published in English).⁸ Nine studies (n=682 patients) evaluated the bulking agent, cross-linked collagen. Rates of patients considered cured or improved in individual studies ranged from 21% to 81% at 12 months, 7% to 52% at 2 years, and 30% to 43% at more than 4 years. Eight trials (n=507 patients) used cross-linked polydimethylsiloxane injection. Cure rates ranged from 20% to 71% at 12 months and 18% to 40% at long-term follow-up (to 60 months). Reviewers concluded that bulking agents had demonstrated effectiveness at 1 year, but results, particularly with older agents, diminished over time and required repeated injections to restore or enhance improvement.

U.S. FOOD AND DRUG ADMINISTRATION-APPROVED BULKING AGENTS

Carbon-Coated Beads (e.g., Durasphere)

A double-blind, RCT comparing carbon-coated beads with cross-linked collagen was reported by Lightner et al (2001) as part of the U.S. Food and Drug Administration (FDA) approval process for Durasphere.⁹ The trial found no difference in efficacy or in number of treatments between groups, although trial duration (12 months) might not have been sufficient to assess comparative durability.

Calcium Hydroxylapatite (e.g., Coaptite)

Calcium hydroxylapatite (Coaptite) received FDA approval based partly on results from a single-blind randomized noninferiority comparison of collagen products among women with SUI. This trial was later published by Mayer et al (2007) and reported on 231 (78%) of 296 enrolled women.¹⁰ For the primary outcome measure, 83 (63%) patients treated with calcium hydroxylapatite and 57 (57%) control patients treated with collagen showed an improvement of 1 grade or more on the 4-grade Stamey Urinary Incontinence Scale at 12-month follow-up. Similar results were obtained by an intention-to-treat analysis, with noninferiority of calcium hydroxylapatite to collagen for improvement of at least 1 Stamey grade (58% vs. 51%, respectively) and decrease in pad weight (51% vs. 38%, respectively) of 50% or more.

POLYACRYLAMIDE HYDROGEL (EG, BULKAMID)

Randomized Controlled Trials

Polyacrylamide hydrogel (Bulkamid; Contura International A/S) is a gel containing 2.5% cross-linked polyacrylamide and 97.5% a pyrogenic water. Sokol et al (2014) reported on an RCT performed under an FDA regulated investigational device exemption.¹¹ This single-blind multicenter randomized noninferiority trial compared Bulkamid with collagen gel (Contigen) in 345 women from 33 study sites in the US and Canada. Up to 3 injections were given. Patients had failed at least 2 previous non-invasive therapies for 3 months each (e.g., behavioral modification, electrical stimulation, pelvic muscle exercise, biofeedback, and/or drug therapy). Patients completed the outcome measures at 1, 3, 6, 9, and 12 months after the last bulking procedure. The primary outcome measure was the responder rate at 12 months, determined by a composite of a 50% decrease in leakage, as measured by the 24-hour pad test, and a minimum 50% decrease in self-reported daily incontinence episodes. Similar rates of patients completed the study (87.8% vs. 87.9%). Bulkamid met the noninferiority margin, with a minimum 50% decrease in leakage and incontinence episodes in 45.9% of patients in the

hydrogel group and 41.4% of patients in the collagen gel group according to the intention-to-treat analysis. At 12 months, 47% of patients treated with hydrogel and 50% of patients treated with collagen gel reported no stress incontinence episodes. Urinary Incontinence Quality of Life Scale scores improved similarly in both groups (+31.4 vs. +26.3 points; p-value not reported). A treatment-related serious adverse event occurred in a single patient in the Bulkamid group and involved an episode of transient hematuria. A possible study design and conduct limitation is that bias due to inadequate allocation concealment cannot be ruled out as methods were not described.

Itkonen Freitas et al (2020) evaluated whether Bulkamid is noninferior to tension-free vaginal tape in 224 women with primary SUI not responsive to conservative treatment recruited between September 2015 and March 2017.¹² Enrollees were randomly assigned to tension-free vaginal tape (n=111) or Bulkamid (n=113). The primary outcome was patient treatment satisfaction as measured on a visual analogue scale with 0 representing extremely unsatisfied and 100 extremely satisfied. This outcome was measured at postoperative visits and a patient satisfaction score ≥ 80 was defined as a good satisfaction rating. In the Bulkamid group, 46 (43%) women requested additional injection at the 3 month visit while 11 (10%) women did not request additional Bulkamid but preferred to receive tension-free vaginal tape. An additional 5 women eventually underwent tension-free vaginal tape after 2 Bulkamid treatments. In the tension-free vaginal tape group, 2 (2%) women underwent Bulkamid treatment with none undergoing a repeat tension-free vaginal tape procedure. Results revealed that the primary patient satisfaction outcome was achieved by more patients in the tension-free vaginal tape group as compared to the Bulkamid group (96 vs. 64). Bulkamid therapy did not attain the noninferiority threshold set in the study (difference: 35.2%; 95% CI, 24.4 to 45.1, $p < .001$). Objective cure via the cough stress test was also better in the tension-free vaginal tape group as compared to Bulkamid (95% vs. 66.4%; difference: 28.6%; 95% CI, 18.4 to 38.5). Additionally, more women who underwent tension-free vaginal tape would choose the therapy again or recommend it to a friend. The majority of perioperative complications and all reoperations due to complications were associated with tension-free vaginal tape surgery.

Case Series

Several case series, conducted in Europe, have been published. The largest (N=256) is by Pai and Al-Singary (2015).¹³ Women with stress or mixed urinary incontinence (>1 episode per 24 hours) who received injections of Bulkamid were assessed yearly with quality of life measured by visual analog scale and incontinence by the International Consultation on Incontinence Questionnaire. The primary outcome was whether patients were completely dry (cured) or leaked once a week or less (significant improvement). At the 3-month follow-up, 110 (42.9%) were cured and 102 (39.8%) patients reported significant improvement. These percentages were maintained for 5 years (median, 38 months). However, only 60 (23.4%) patients were available for follow-up at 60 months, limiting interpretation of the long-term results.

A multicenter series by Lose et al (2010) included 135 adult women with symptomatic stress (n=67) or mixed (n=68) incontinence.¹⁴ Eligibility included the presence of symptoms for at least 12 months, including at least 1 episode of incontinence daily. Ninety-eight (73%) patients completed 12-month follow-up. The primary outcome was response to treatment, defined as patients self-reporting that they considered themselves "improved" or "cured." The response rate was 71% at 6 months and 66% at 12 months. Corresponding cure rates were 16% and

24%. There were 32 treatment-related adverse effects including 2 cases of urinary retention requiring hospitalization and 10 cases of urinary tract infection.

A 2-center prospective series by Maggiore et al (2013) included 82 women who had had stress incontinence for at least 12 months.¹⁵ Patients received an injection of Bulkamid, and nonresponders were offered a second injection after 3 months. A total of 80 (98%) women were evaluated at 3 and 6 months, and 78 (95%) completed 1-year follow-up. The primary efficacy outcome was the subjective success rate at 1 year, defined as answering 1 or 2 on the Patient Global Improvement Impression questionnaire, which is scored from 1 (very much better) to 7 (very much worse). In an intention-to-treat analysis, the subjective success rate at 1 year was 74% (61/82 patients). Seven patients reported no change, and none reported symptom worsening. At 1 year, 87% (71/78) of patients were considered to be responders (answer of 1, 2 or 3 on the Patient Global Improvement Impression). Twenty-one (26%) patients had adverse events attributable to the injection procedure. The most common adverse event was urinary tract infection, reported by 8 patients. Four patients reported de novo urinary urgency; in all cases, this resolved by 3 months.

Eight-year outcomes were reported by Mouritsen et al (2014) for 24 women, of whom 15 (62.5%) had no further treatment, 1 received a second treatment with hydrogel, and 7 had placement of mid-urethral slings.¹⁶ Subjectively, 44% considered their incontinence to be cured or much improved. Vaginal ultrasonography showed visible hydrogel deposits in all patients.

Polydimethylsiloxane (e.g., Silicone, Macroplastique)

FDA approval of polydimethylsiloxane (Macroplastique) was also partly based on a randomized noninferiority comparison with collagen in women with SUI. Results of this trial were published by Ghoneim et al (2009).¹⁷ The trial was single-blind; patients, but not providers, were blinded. At 12 months, Macroplastique was found to be noninferior to collagen in terms of the primary efficacy variable, and improvement in the Stamey Urinary Incontinence Scale. Seventy-five (61%) of 122 patients in the Macroplastique group and 60 (48%) of 125 patients in the collagen group improved at least 1 Stamey grade ($p < .001$ for noninferiority). Twelve of the 247 randomized patients were excluded from the analysis. Two-year data on 67 of the 75 women who responded to treatment with Macroplastique were published Ghoneim et al (2010).¹⁸ Fifty-six (84%) of the 67 patients had sustained treatment success at 24 months, defined as an improvement of at least 1 Stamey grade over baseline. Forty-five (67%) of the 67 patients evaluated at 24 months were dry (Stamey grade 0). The long-term analysis was limited because it only included a portion of responders from 1 arm of the trial. The analysis included 67 (55%) of 122 patients originally randomized to Macroplastique and did not provide data on the comparison group.

NON-FOOD AND DRUG ADMINISTRATION-APPROVED BULKING AGENTS

Dextranomer/Hyaluronic Acid (e.g., Zuidex) With an Injection System (e.g., Implacer)

Dextranomer/hyaluronic acid (Zuidex®; AstraZeneca) with an injection system (Implacer®; Q-Med AB) is used to deliver the bulking agent in the outpatient clinic setting without endoscopy. An industry-sponsored (Q-Med) randomized noninferiority trial conducted in North America compared the Zuidex system plus the Implacer with Contigen. As reported by Lightner et al

(2009), patients were blinded to treatment group.¹⁹ The primary study outcome was the proportion of women who had a 50% or greater reduction in urinary leakage on provocation testing from baseline to 12 months after the final treatment (up to 3 treatments were permitted). The primary outcome was achieved by 65% of Zuidex-treated women compared with 84% in the Contigen group; noninferiority of Zuidex was not established. The trial was limited by a high rate of missing data; primary outcomes data were missing for 35% of randomized patients.

An open multicenter study from Europe by Chapple et al (2005) reported on a 12-month 77% positive response rate (reduction $\geq 50\%$ for provocation test urinary leakage) with the dextranomer/hyaluronic acid (Zuidex system with Implacer) in 142 women who met strict inclusion and exclusion criteria.²⁰ Similar to the North American trial, this study had a high dropout rate (24%), an unrepresentative patient population, and lacked a comparison group. Twenty-one women in this study were followed for a mean of 6.7 years after treatment with the Zuidex system.²¹ At this long-term follow-up, 7 (33%) of 21 were continent, but 6 of the 7 had had other continence procedures since their Zuidex injections.

Polytetrafluoroethylene (e.g., Teflon)

No published clinical trials were identified on polytetrafluoroethylene as a bulking agent.

BULKING AGENTS NOT REQUIRING FDA APPROVAL

Autologous Fat and Autologous Ear Chondrocytes

Other materials have been used as bulking agents but have not demonstrated the same sustained effectiveness as cross-linked collagen or carbon-coated beads. In a double-blind RCT of 56 women that compared periurethral injections of autologous fat (treatment group) with saline (placebo group), Lee et al (2001) found that periurethral fat injections were not more efficacious than placebo for treating stress incontinence.²² At 3 months, only 6 (22.2%) of 27 patients in the treatment group and 6 (20.7%) of 29 in the placebo group were cured or improved. In addition, 1 death occurred as a result of a pulmonary fat embolism. In another clinical trial of 32 women, Bent et al (2001) reported that 50% of patients remained dry for 12 months after receiving a single outpatient injection of harvested autologous auricular cartilage.²³ While autologous substances have a nonimmunogenic advantage, their use may be limited by resorption and fibrous replacement along with local discomfort associated with harvesting procedures.

Autologous Cellular Therapy

Strasser et al (2007) published the first RCT using autologous cell therapy to treat SUI.²⁴ While widely cited as an important advance in the field, the *Lancet* retracted publication of this trial in 2008 due to ethical and quality concerns.²⁵

Pooled safety data from 80 patients in 2 phase 1/2 dose-response trials from Cook MyoSite were reported by Peters et al (2014).²⁶ A phase 3 trial (NCT01382602) with 150 patients was completed in 2017, but trial results were not identified.

Section Summary: Urinary Incontinence

A number of RCTs and a Cochrane review of RCTs evaluating periurethral bulking agents for the treatment of urinary incontinence have been published. The trials vary by bulking agents used

and comparator interventions (e.g., placebo, conservative therapy, surgical procedure, another bulking agent). Due to this heterogeneity across studies, and the small number of studies in each category, Cochrane reviewers were unable to draw specific conclusions about the efficacy of specific bulking agents compared with alternative treatments. Additionally, authors of another recent systematic review concluded that bulking agents were less effective than surgical procedures regarding subjective improvement after treatment, with no difference between the interventions with regard to complications. Cross-linked collagen is the most well-established bulking agent, but it was withdrawn from the market. Results from available trials have suggested that carbon-coated spheres, calcium hydroxylapatite, polyacrylamide hydrogel and polydimethylsiloxane have efficacy for treating incontinence that is similar to cross-linked collagen. For other agents (e.g., autologous cellular therapy, autologous fat, autologous ear chondrocytes, Teflon), there are few RCTs and little evidence of efficacy.

FECAL INCONTINENCE

Clinical Context and Therapy Purpose

The purpose of injectable bulking agents in patients who have fecal incontinence is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does the use of injectable bulking agents improve the net health outcome in patients with fecal incontinence?

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is patients with fecal incontinence.

Interventions

The therapy being considered is injectable bulking agents.

Comparators

The following therapies are currently being used to make decisions about fecal incontinence: conservative therapy, sacral nerve stimulation, and surgery.

Outcomes

The general outcomes of interest are symptom reduction, symptom recurrence, and treatment-related adverse events. Bulking agents may or may not be curative, and follow-up injection may be necessary within 6 months. Beneficial effects may last between 3 and 12 months.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.

- Studies with duplicative or overlapping populations were excluded.

REVIEW OF EVIDENCE

Systematic Reviews

A comparative effectiveness review, conducted by Forte et al (2016) for the Agency for Healthcare Research and Quality, evaluated treatments for fecal incontinence.²⁷ Reviewers found low strength of evidence from 2 RCTs that dextranomer anal bulking injections (NASHA Dx, Solesta) were more effective than sham injections on some outcome measures (i.e., 50% reduction in episodes, number of incontinence-free days, quality of life) but not more effective than sham on fecal incontinence severity or frequency, and no more effective than pelvic floor muscle training with biofeedback on fecal incontinence severity or quality of life. There was moderate strength of evidence from 2 RCTs comparing Durasphere with a non-FDA approved bulking agent that off-label use of Durasphere reduced fecal incontinence severity for up to 6 months, with diminishing improvements after that time.

Maeda et al (2013) updated a Cochrane review assessing perianal injectable bulking agents for treating fecal incontinence.²⁸ Reviewers identified 5 RCTs (N=382 patients) comparing bulking agents with placebo, no intervention, or an alternative intervention. The 5 trials all included adults with internal anal sphincter dysfunction or passive fecal incontinence who had failed previous conservative treatments (e.g., pelvic floor muscle training). One of the 5 trials (detailed next) used the FDA approved bulking agent dextranomer in stabilized hyaluronic acid (Solesta). Two trials used a placebo or sham control, 2 compared different bulking agents, and the fifth trial compared 2 methods of injecting the same agent. Length of follow-up ranged from 3 to 12 months. Four trials were judged to be of high or uncertain risk of bias. The greatest potential source of bias was lack (or unclear) blinding of outcome assessment and lack of blinding of surgeons performing the procedure. Due to heterogeneity among trials, study findings were not pooled. Overall, conclusions on efficacy were limited by the small number of RCTs identified, most of which had methodologic limitations, and lack of long-term follow-up.

Previously, 2 systematic reviews were published that included observational studies and RCTs evaluating bulking agents for treating fecal incontinence.^{29,30} Hussain et al (2011) included 1070 patients from 39 studies in a safety analysis. Adverse events occurred in 139 (13.5%) patients. The most common complication was pain, which occurred in 67 (6.5%) patients, followed by leakage of injected material, which was reported by 58 (5.6%) patients. Reviewers did not report the number of serious adverse events.

Randomized Controlled Trials

The RCT evaluating Solesta, included in the 2011 Cochrane review, was an industry-sponsored multicenter trial, reported by Graf et al (2011), that compared Solesta with sham treatment in 206 adults.³¹ To be eligible for inclusion, patients had to have a Cleveland Clinic Florida Fecal Incontinence Score of 10 or higher, at least 4 documented incontinence episodes in 2 weeks, symptoms for at least 12 months, and failure of at least 1 medically supervised conservative treatment (which could include dietary modification, fiber supplements, or loperamide hydrochloride). Patients received an initial injection, and those with persistent symptoms and no substantial adverse effects at 1 month were offered a second injection. A total of 112 (86%) patients in the active treatment group and 61 (87%) patients in the sham group received a

second procedure. Response to treatment was defined as a reduction in the number of incontinence episodes by 50% or more compared with baseline. The trial was double-blind for the first 6 months of follow-up; at 6 months, patients in the sham group were offered active treatment. Thus, the primary efficacy outcome was assessed at 6 months.

A total of 197 (96%) of 206 randomized patients completed 6-month follow-up and were included in the primary efficacy analysis. Seventy-one (52%) in the active treatment group and 22 (31%) in the sham group had a 50% or greater reduction in incontinence episodes at 6 months. The difference between groups was statistically significant (odds ratio, 2.36; 95% CI, 1.24 to 4.47; $p=.009$). Findings for secondary outcomes at 6 months were mixed. For example, the mean increase in the number of incontinence-free days was significantly higher in the active treatment group (3.1) than the sham group (1.7; $p=.016$), but the median decrease in the number of incontinence episodes did not differ significantly between groups (6.0 vs. 3.0, respectively; $p=.09$). Moreover, change in the Cleveland Clinic Florida Fecal Incontinence Score did not differ significantly between groups at 6 months (2.5 points for active treatment vs. 1.7 points for sham treatment). Quality of life was measured by the Fecal Incontinence Quality of Life instrument, which has 4 subscales. One of the 4 subscales (coping and behavior) improved significantly more in the treatment group than in the sham group at 6 months. Change in scores on the other 3 subscales (lifestyle, depression and self-perception, embarrassment) did not differ significantly between groups at 6 months. Trialists did not report the proportion of patients continent at follow-up, either as a primary or secondary outcome.

During the 6-month blinded treatment phase, 128 adverse events were reported in the active treatment group and 29 in the sham group. The most common adverse event in the active treatment group was proctalgia, which occurred in 19 (14%) patients (vs. 2 [3%] patients in the sham group). Moreover, 10 (7%) patients in the active treatment group and 1 (1%) patient in the sham group had a rectal hemorrhage. Injection site bleeding occurred in 12 (17%) patients in the sham group and in 7 (5%) patients in the active treatment group. Two serious adverse events were reported, both in the active treatment group (1 rectal abscess, 1 prostate abscess).

Subsequent to the Cochrane reviewers' search of the literature, Dehli et al (2013) published findings of an RCT evaluating Solesta.³² A total of 126 adults with fecal incontinence were randomized to injectable bulking agents ($n=62$) or a 6-month biofeedback intervention ($n=64$). Patients in the bulking agent group who reported minor or no symptom improvement at 3 months received a second injection. The primary efficacy outcome was incontinence severity, as measured by the St. Mark's Fecal Incontinence Grading System score, which ranges from 0 (perfect continence) to 24 (maximal incontinence). A St. Mark's score of at least 4 was required for study participation. Ten (8%) patients dropped out of the study before 6 months. At the 6-month follow-up, the mean St. Mark's score in the biofeedback group had decreased from 12.6 points (95% CI, 11.4 to 13.8) at baseline to 9.2 points (95% CI, 7.9 to 10.5). In the bulking agents group, mean scores were 12.9 (95% CI, 11.8 to 14.0) at baseline and 8.9 (95% CI, 7.6 to 10.2) at 6 months. This difference between groups in St. Mark's score reduction was not statistically significant. In addition, change in St. Mark's score did not differ between groups at 24 months, and only 61 (49%) patients completed the 24-month follow-up. Three of the first 10 patients in the bulking agent group developed infections at the injection site and underwent treatment; subsequent patients in this group received prophylactic antibiotics.

Another RCT, conducted by Morris et al (2013) in Australia, compared 2 bulking agents for fecal incontinence. Neither agent was FDA approved for use in the United States.³³ The trial was terminated early because 1 of the agents was removed from the Australian Pharmaceutical Benefits Scheme. The trial found no difference in efficacy between agents. The trial lacked a comparison group of patients not receiving bulking agents, which limits the ability to draw conclusions about the relative efficacy of bulking agents to sham or alternative treatments.

Uncontrolled Trials

Longer term data on Solesta are available from an uncontrolled study conducted by La Torre et al (2013).³⁴ A total of 115 patients with fecal incontinence received 4 injections of Solesta. Eighty-three (72%) of 115 patients completed the 24-month follow-up. The primary efficacy end point was a response to treatment, defined as a minimum 50% reduction from baseline in the number of fecal incontinence episodes recorded in a 28-day diary. At the 24-month follow-up, 52 (63%) of 83 patients with data available had responded to treatment. The median number of incontinence-free days in a 28-day period increased from 14.6 at baseline to 21.7 at 24 months. The study lacked a comparison group and had a high dropout rate.

Section Summary: Fecal Incontinence

Several RCTs and systematic reviews of RCTs on bulking agents for the treatment of fecal incontinence have been published. A 2016 comparative effectiveness review from the Agency for Healthcare Research and Quality evaluated 2 RCTs with the FDA approved product NASHA Dx (Solesta) and 2 RCTs with Durasphere. One RCT using NASHA Dx found that, compared with sham, NASHA Dx improved some outcomes but not others. The other RCT did not find a significant difference in efficacy between NASHA Dx and biofeedback. Two other RCTs evaluating Durasphere (off-label in the U.S.) found short-term improvements in fecal incontinence severity. Overall, the evidence is not sufficient to conclude that bulking agents are an effective treatment for fecal incontinence. Corroboration of the single positive trial is needed, and controlled trials with longer follow-up are important to determine the durability of any treatment effect.

Summary of Evidence

For individuals who have SUI who receive injectable bulking agents, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. The trials vary by bulking agents used and comparator interventions (e.g., placebo, conservative therapy, surgical procedure, another bulking agent). Due to this heterogeneity across studies, and the small number of studies in each category, Cochrane reviewers were unable to draw specific conclusions about the efficacy of specific bulking agents compared with alternative treatments. Additionally, authors of another recent systematic review concluded that bulking agents were less effective than surgical procedures regarding subjective improvement after treatment, with no difference between the interventions with regard to complications. Studies have shown that cross-linked collagen improves the net health outcome (i.e., it is effective in some patients who have failed conservative treatment with fewer adverse events than surgery), although products that cross-link in such a way are no longer commercially available. There is evidence that the FDA approved carbon-coated spheres, calcium hydroxylapatite, polyacrylamide hydrogel and polydimethylsiloxane have efficacy for treating incontinence, and further that they produce outcomes with a safety profile similar to

cross-linked collagen. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have fecal incontinence who receive injectable bulking agents, the evidence includes RCTs and systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, quality of life, and treatment-related morbidity. A comparative effectiveness review from the Agency for Healthcare Research and Quality evaluated 2 RCTs with the FDA approved product NASHA Dx (Solesta) and 2 RCTs with Durasphere (off-label in the United States). One RCT comparing NASHA Dx with sham found that NASHA Dx improved some outcomes but not others. The other RCT did not find a significant difference in efficacy between NASHA Dx and biofeedback. Two additional RCTs evaluating Durasphere found only short-term improvements in fecal incontinence severity. Controlled trials with longer follow-up are needed to determine the durability of any treatment effect. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

SUPPLEMENTAL INFORMATION

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

Clinical Input From Physician Specialty Societies and Academic Medical Centers

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

In response to requests, input was received from 4 physician specialty societies and 4 academic medical centers while this policy was under review in 2013. There was consensus agreement with all of the policy statements among reviewers who provided responses. In particular, there was unanimous agreement among respondents for the statement that use of perianal bulking agents to treat fecal incontinence is considered investigational.

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

URINARY INCONTINENCE

American Urological Association and Society of Urodynamics

The 2017 joint guidelines on the surgical treatment of female stress urinary incontinence (SUI) from the American Urological Association and Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction stated that bulking agents are an option for patients considering surgery for SUI.³⁵ The guidelines also stated that there are few long-term data on the efficacy of bulking agents and that retreatment is common.

National Institute for Health and Care Excellence

In 2015, the National Institute for Health and Care Excellence updated its guidance on urinary incontinence in women.³⁶ The updated guidance recommended considering "intramural bulking agents (silicone, carbon-coated zirconium beads or hyaluronic acid/dextran copolymer) for the management of stress UI [urinary incontinence] if conservative management has failed. Women should be made aware that:

- repeat injections may be needed to achieve efficacy
- efficacy diminishes with time
- efficacy is inferior to that of synthetic tapes or autologous rectus fascial slings."

American College of Obstetricians and Gynecologists

In 2016 (reaffirmed in 2019), the American College of Obstetricians and Gynecologists updated its practice bulletin on urinary incontinence in women.³⁷ The practice bulletin stated that "urethral bulking injections are a relatively noninvasive treatment for stress urinary incontinence that may be appropriate if surgery has failed to achieve adequate symptom reduction, if symptoms recur after surgery, in women with symptoms who do not have urethral mobility, or in older women with comorbidities who cannot tolerate anesthesia or more invasive surgery. However, urethral bulking agents are less effective than surgical procedures such as sling placement and are rarely used as primary treatment for stress urinary incontinence." There was insufficient evidence to recommend any specific bulking agent.

FECAL INCONTINENCE**American College of Obstetricians and Gynecologists**

In 2019, the American College of Obstetricians and Gynecologists published a practice bulletin on the clinical management of fecal incontinence in women.³⁸ The College stated that "anal sphincter bulking agents may be effective in decreasing fecal incontinence episodes up to 6 months and can be considered as a short-term treatment option for fecal incontinence in women who have failed more conservative treatments." This recommendation is based on limited or inconsistent scientific evidence.

American Society of Colon and Rectal Surgeons

In 2015, the American Society of Colon and Rectal Surgeons updated its practice parameters for the treatment of fecal incontinence.³⁹ The Society gave a weak recommendation based on moderate-quality evidence (2B) that injection of bulking agents into the anal canal may help to decrease episodes of passive fecal incontinence. Studies reviewed showed modest short-term improvements, and no study identified showed a long-term benefit of bulking agents.

National Institute for Health and Care Excellence

In 2007, the National Institute for Health and Care Excellence published guidance on injectable bulking agents for treating fecal incontinence.⁴⁰ The guidance stated that there is insufficient evidence to support the safety and efficacy of injectable bulking agents for fecal incontinence.

U.S. Preventive Services Task Force Recommendations

Not applicable.

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

NCT No.	Trial Name	Planned Enrollment	Completion Date
<i>Ongoing</i>			
NCT01115465	Real-time Observation of Safety and Effectiveness in the Treatment of Female Stress Urinary Incontinence	276	Feb 2022
NCT02538991	TVT Versus Bulkamid®-Injections in Treatment of Stress Urinary Incontinence - Patient Satisfaction and Complications of the Treatment	224	Dec 2022
NCT03474653	Latitude-An Observational Study of Patient Choice and the Urethral Bulking Agent, Bulkamid, Used for the First Line Treatment for Stress Urinary Incontinence and the Impact on a Subsequent Mid Urethral Sling	399	Jun 2023
NCT03811821	Comparative Effectiveness of Biofeedback and Injectable Bulking Agents for Treatment of Fecal Incontinence: The Fecal Incontinence Treatment (FIT) Study	285	Dec 2023

NCT: national clinical trial.

^a Denotes industry-sponsored or cosponsored trial.

CODING

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. This may not be a comprehensive list of procedure codes applicable to this policy.

Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

The code(s) listed below are medically necessary ONLY if the procedure is performed according to the "Policy" section of this document.

CPT/HCPCS

46999	Unlisted procedure, anus
51715	Endoscopic injection of implant material into the submucosal tissues of the urethra and/or bladder neck
0377T	Anoscopy with directed submucosal injection of bulking agent for fecal incontinence
L8603	Injectable bulking agent, collagen implant, urinary tract, 2.5 ml syringe, includes shipping and necessary supplies
L8604	Injectable bulking agent, dextranomer/hyaluronic acid copolymer implant, urinary tract, 1 ml, includes shipping and necessary supplies
L8605	Injectable bulking agent, copolymer/hyaluronic acid copolymer implant, anal canal, 1 ml, includes shipping and necessary supplies
L8606	Injectable bulking agent, synthetic implant, urinary tract, 1 ml syringe, includes shipping and necessary supplies

ICD-10 DIAGNOSES

N36.43	Combined hypermobility of urethra and intrinsic sphincter deficiency
N36.42	Intrinsic sphincter deficiency (ISD)
N39.3	Stress incontinence (female) (male)
R15.0	Incomplete defecation
R15.1	Fecal smearing
R15.2	Fecal urgency
R15.9	Full incontinence of feces

REVISIONS

04-10-2012	Effective for Institutional providers 30 days after the Revision Date.
	Policy added to the bcbsks.com web site.
08-19-2013	In the Policy Title, added "and Fecal" to read "Periurethral Bulking Agents for the Treatment of Urinary and Fecal Incontinence"
	Updated Description section.
	In Policy section:

	<ul style="list-style-type: none"> Added Item E, "The use of perianal bulking agents to treat fecal incontinence is considered experimental / investigational."
	Updated Rationale section.
	In Coding section: <ul style="list-style-type: none"> Added HCPCS codes: C9735 and L8605 Added Diagnosis codes: 787.60-787.63
	Updated Reference section.
12-31-2013	In Coding section: <ul style="list-style-type: none"> Added ICD-10 Diagnosis (<i>Effective October 1, 2014</i>)
01-01-2015	Policy posted to the website February 10, 2014.
	In Coding section: <ul style="list-style-type: none"> Added CPT Code: 0377T (Effective January 1, 2015) Deleted HCPCS Code: C9735 (Effective January 1, 2015)
05-26-2015	Policy title changed from "Periurethral Bulking Agents for the Treatment of Urinary and Fecal Incontinence"
	Updated Description section.
	In Policy section: <ul style="list-style-type: none"> Removed "cross-linked collagen", to read, "The use of carbon-coated spheres, calcium hydroxylapatite, or polydimethylsiloxane may be considered medically necessary to treat stress urinary incontinence in men and women who have failed appropriate conservative therapy."
	Updated Rationale section.
	Updated References section.
10-26-2016	Updated Description section.
	Updated Rationale section.
	Updated References section.
11-22-2016	In Policy section: <ul style="list-style-type: none"> In Item A, removed "men and women" and added "individuals" to read, "The use of carbon-coated spheres, calcium hydroxylapatite, or polydimethylsiloxane may be considered medically necessary to treat stress urinary incontinence in individuals who have failed appropriate conservative therapy."
09-28-2017	Updated Description section.
	Updated Rationale section.
	In Coding section: <ul style="list-style-type: none"> Updated coding bullets.
	Updated References section.
11-01-2018	Updated Description section.
	Updated Rationale section.
	In Coding section: <ul style="list-style-type: none"> Added HCPCS code: L8604. Removed ICD-9 codes.
	Updated References section.
09-25-2019	Updated Description section.
	In Coding section: <ul style="list-style-type: none"> Coding notations removed.
	Updated Rationale section.
	Updated References section.
03-13-2020	Policy Posted 02-14-2020. Policy effective 03-13-2020.
	In Coding section: <ul style="list-style-type: none"> Added CPT Code: 46999 (Eff 03-13-2020)

	<ul style="list-style-type: none"> ▪ Deleted CPT Code: 0377T (Eff 01-01-2020)
04-23-2021	Updated Description section.
	In Coding section: <ul style="list-style-type: none"> ▪ Removed HCPCS code Q3031.
	Updated Rationale section.
	Updated References section.
11-18-2021	Updated Description Section
	Updated policy Section <ul style="list-style-type: none"> • Section A added Polyacrylamide hydrogel.
	Updated Rationale Section
	Updated References Section

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