EURASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
Innovative Academy Research Support Center
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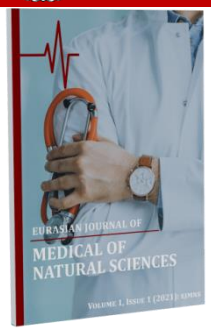

# GASTROJEJUNAL ANASTOMOTIC STRICTURES AFTER BYPASS OPERATIONS: PREVENTION AND TREATMENT

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https://doi.org/10.5281/zenodo.15680403

**ARTICLE INFO**

Received: 10th June 2025
Accepted: 16th June 2025
Online: 17th June 2025

**KEYWORDS**

*Gastrojejunal stricture, gastric bypass, anastomosis, endoscopic dilation, bariatric surgery complications.*

**ABSTRACT**

*Gastrojejunal anastomotic strictures represent a significant complication following Roux-en-Y gastric bypass (RYGB) surgery, occurring in 3-27% of patients and substantially impacting quality of life and nutritional status. This comprehensive review examines the etiology, risk factors, prevention strategies, and treatment modalities for anastomotic strictures in bariatric surgery. Understanding the pathophysiology of stricture formation and implementing evidence-based prevention and treatment protocols is essential for optimizing patient outcomes and minimizing long-term complications. Current management approaches include endoscopic balloon dilation, bougie dilation, steroid injection, and surgical revision, with success rates varying from 70-95% depending on stricture characteristics and treatment modality.*

**Introduction.** Roux-en-Y gastric bypass (RYGB) remains one of the most effective bariatric procedures for achieving sustained weight loss and resolution of obesity-related comorbidities (1). Despite its proven efficacy, RYGB is associated with several potential complications, among which gastrojejunal anastomotic strictures represent a significant concern affecting patient quality of life and long-term outcomes (2).

Gastrojejunal strictures occur when the diameter of the gastrojejunal anastomosis decreases below the functional threshold, typically less than 10-12mm, resulting in symptoms of gastric outlet obstruction (3). The reported incidence varies widely from 3% to 27% across different studies, with most contemporary series reporting rates between 5-15% (4). This variation reflects differences in surgical technique, anastomotic construction methods, patient populations, and diagnostic criteria.

The clinical significance of anastomotic strictures extends beyond immediate symptoms to include potential impacts on weight loss outcomes, nutritional status, and overall patient satisfaction (5). Early recognition and appropriate management are crucial for preventing complications such as dehydration, malnutrition, and gastric perforation (6). The evolution of endoscopic techniques has transformed the management paradigm, offering minimally invasive treatment options with high success rates and low morbidity (7).

Understanding the multifactorial etiology of stricture formation, including technical, biological, and patient-specific factors, is essential for developing effective prevention strategies and optimizing treatment protocols (8).

## PATHOPHYSIOLOGY OF STRICTURE FORMATION

### WOUND HEALING AND ANASTOMOTIC HEALING

The pathophysiology of gastrojejunal stricture formation involves complex interactions between surgical trauma, inflammatory response, and tissue healing processes (9). Normal anastomotic healing occurs through three overlapping phases: inflammatory, proliferative, and remodeling. Disruption of this normal healing cascade can lead to excessive collagen deposition and subsequent stricture formation (10).

The inflammatory phase, lasting 3-5 days post-operatively, is characterized by neutrophil and macrophage infiltration, cytokine release, and platelet aggregation (11). Excessive or prolonged inflammation, often resulting from technical factors such as tissue tension, ischemia, or foreign body reaction, can predispose to pathological healing and stricture development (12).

During the proliferative phase (days 3-21), fibroblast proliferation and collagen synthesis occur. Factors that enhance this phase, including mechanical stress, infection, or anastomotic leak, can result in excessive scar tissue formation (13). The balance between collagen synthesis and degradation during the remodeling phase (weeks to months) ultimately determines the final anastomotic configuration (14).

## TECHNICAL FACTORS IN STRICTURE DEVELOPMENT

Several technical factors during RYGB construction influence stricture risk. Anastomotic diameter is fundamental, with smaller anastomoses (≤10mm) showing higher stricture rates (15). The method of anastomotic construction significantly impacts outcomes, with studies suggesting lower stricture rates with hand-sewn techniques compared to certain stapled methods (16).

Tissue tension at the anastomosis contributes to ischemia and impaired healing. Excessive tension may result from inadequate jejunal mobilization, short mesenteric length, or inappropriate pouch construction (17). The presence of foreign material, including non-absorbable sutures, staples, or excessive cautery damage, can trigger chronic inflammation and subsequent stricture development (18).

## PATIENT-SPECIFIC RISK FACTORS

Patient-specific factors significantly influence stricture development risk. Age appears to play a role, with some studies suggesting higher rates in older patients, possibly related to impaired healing capacity and increased comorbidity burden (19). Gender differences have been reported, with some series showing higher stricture rates in women, though the mechanism remains unclear (20).

Comorbid conditions affecting wound healing, including diabetes mellitus, peripheral vascular disease, and autoimmune disorders, increase stricture risk (21). Smoking represents a modifiable risk factor, with nicotine's vasoconstrictive effects and impaired tissue oxygenation contributing to poor healing outcomes (22).

## CLINICAL PRESENTATION AND DIAGNOSIS

### SYMPTOM PATTERNS

Gastrojejunal strictures typically present within the first 3-6 months following RYGB, coinciding with peak scar tissue formation (23). The classic presentation includes progressive dysphagia, initially to solids and eventually to liquids, accompanied by postprandial nausea and vomiting (24). Patients often report feeling "stuck" after eating small amounts of food, leading to avoidance behaviors and reduced oral intake (25).

Secondary symptoms develop as the condition progresses, including dehydration, weight loss beyond expected parameters, fatigue, and nutritional deficiencies (26). Some patients may present with gastric perforation, a rare but serious complication requiring immediate surgical intervention (27).

**DIAGNOSTIC MODALITIES**

Upper gastrointestinal (UGI) series remains the gold standard for diagnosing gastrojejunal strictures, providing detailed anatomical information about anastomotic diameter and configuration (28). Contrast studies can differentiate between anastomotic strictures and other causes of gastric outlet obstruction, including internal hernias or adhesive bands (29).

Upper endoscopy offers direct visualization of the anastomosis and allows therapeutic intervention during the same procedure (30). Endoscopic assessment provides accurate measurement of anastomotic diameter using standardized instruments and enables tissue sampling if malignancy is suspected (31).

**PREVENTION STRATEGIES**

**SURGICAL TECHNIQUE OPTIMIZATION**

Prevention of gastrojejunal strictures begins with meticulous surgical technique during RYGB construction. Optimal anastomotic diameter, typically 12-15mm, provides adequate luminal size while maintaining restriction (32). Standardization of anastomotic construction techniques within bariatric programs has been associated with reduced complication rates (33).

Hand-sewn anastomoses, when performed by experienced surgeons, may offer advantages in terms of stricture prevention compared to certain stapled techniques (34). The choice of suture material influences outcomes, with absorbable monofilament sutures showing favorable results compared to braided or non-absorbable materials (35).

Ensuring adequate blood supply to both gastric and jejunal components is crucial for proper healing (36). This requires careful preservation of vascular arcades, avoidance of excessive skeletonization, and tension-free anastomotic construction (37).

**PERIOPERATIVE MANAGEMENT**

Perioperative optimization includes correction of nutritional deficiencies, particularly protein and micronutrients essential for wound healing (38). Preoperative smoking cessation, ideally 6-8 weeks before surgery, significantly reduces complication rates (39). Management of diabetes mellitus and other comorbid conditions helps optimize healing potential (40).

**TREATMENT MODALITIES**

**ENDOSCOPIC INTERVENTIONS**

Endoscopic balloon dilation has emerged as the first-line treatment for gastrojejunal strictures, offering a minimally invasive approach with high success rates (41). The procedure involves progressive dilation using pneumatic balloons of increasing diameter, typically

starting with 12mm balloons and progressing to 15-18mm depending on patient tolerance and anatomy (42).

Success rates for endoscopic balloon dilation range from 75-95%, with most patients requiring 1-3 treatment sessions (43). Factors associated with treatment success include stricture length (<2cm), recent onset (<6 months), and absence of complete obstruction (44).

Complications of endoscopic dilation are relatively uncommon, occurring in 2-5% of procedures, and include perforation, bleeding, and aspiration (45). Alternative endoscopic techniques include bougie dilation and steroid injection at the stricture site to reduce recurrence rates (46).

**SURGICAL MANAGEMENT**

Surgical revision becomes necessary when endoscopic treatments fail or in cases of severe, refractory strictures (47). Surgical options include stricturoplasty, anastomotic revision, or conversion to alternative bariatric procedures (48). Anastomotic revision involves complete reconstruction of the gastrojejunal anastomosis, typically using a larger diameter configuration (49).

**OUTCOMES AND PROGNOSIS**

**SHORT-TERM AND LONG-TERM OUTCOMES**

Immediate success rates for endoscopic dilation are high, with most patients experiencing rapid symptom resolution (50). Studies report technical success rates of 85-95% for achieving adequate anastomotic diameter following dilation procedures. Long-term success rates vary depending on stricture characteristics and patient factors, with studies reporting sustained success rates of 70-85% following endoscopic intervention (51).

Factors associated with long-term success include adequate initial dilation diameter, absence of inflammatory conditions, and compliance with dietary recommendations. Nutritional outcomes following successful stricture treatment generally show improvement, with resolution of deficiencies and restoration of normal eating patterns (52).

**CONCLUSION**

Gastrojejunal anastomotic strictures represent a significant complication following RYGB surgery, affecting 5-15% of patients and substantially impacting quality of life. Understanding the multifactorial etiology is essential for developing effective prevention and treatment strategies. Endoscopic balloon dilation has emerged as the first-line treatment with success rates of 75-95%. Prevention strategies focusing on optimal surgical technique and perioperative optimization show promise for reducing stricture incidence. The multidisciplinary management approach remains essential for optimizing patient outcomes following bariatric surgery.

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