

Fibrin sealant solution to prevent postoperative leakage in laparoscopic sleeve gastrectomy

José Fernando¹, Mónica Valero¹, Ana Isabel Pérez¹, María José Luesma², Irene Cantarero³, Alejandro García¹, **Juan Luis Blas¹**

¹ Servicio de Cirugía General y de Aparato Digestivo. Hospital Royo Villanova. Zaragoza.

² Departamento de Anatomía e Histología Humanas. Universidad de Zaragoza. Zaragoza.

³ Departamento de Ciencias Morfológicas. Universidad de Córdoba. Córdoba.

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Abstract

Fibrin tissue sealants are a therapeutic option as a method of preventing postoperative leakage in laparoscopic sleeve gastrectomy. A descriptive analysis of a series of 116 sleeve gastrectomies was conducted. The average duration of the procedure was 59.43 minutes [25 - 190]. 19 patients (16.37%) had postoperative aspirative drainage. In 24 patients (20.68%), an absorbable continuous suture was added to the staple line. The average hospital stay was 2.96 days [1 - 9]. Complications included one case (0.86%) of hemoperitoneum, two cases (1.72%) of digestive intolerance in the first 48 hours, and four readmissions (3.44%) due to suture line leakage in the cardia, all of which were performed using an automatic endostapler without reinforcement sutures. The use of fibrin sealants in laparoscopic sleeve gastrectomy may be a therapeutic option to improve the rate of postoperative leakage.

Keywords:

- Bariatric surgery
- Sleeve gastrectomy
- Postoperative leakage •
- Fibrin sealantss

Introduction

Sleeve gastrectomy was first introduced in 2003 by Michel Gagner as the first surgical stage for patients with high surgical risk and BMI (Body Mass Index) before undergoing a bypass procedure⁽¹⁻³⁾. However, its successful outcomes made the second surgical stage unnecessary in many cases, leading to its widespread adoption as a standalone procedure^(2,3).

Currently, it is considered one of the most common techniques worldwide⁽³⁻⁵⁾. The technique involves the creation of a sleeve gastrectomy around a tube, leaving a tubular remnant with a capacity of 100-150 ml^(2,4,6). It achieves long-term weight loss results and improves concurrent conditions such as type 2 diabetes mellitus, hypertension, dyslipidemia, obstructive sleep apnea-hypopnea syndrome, and joint pain^(7,8). Its primary mechanisms of action include reducing gastric volume and suppressing appetite by decreasing ghrelin concentration through the resection of the fundus of the stomach⁽⁷⁾. Various modifications to the standard technique

can affect the postoperative recovery and the occurrence of complications^(6,8).

Bleeding from the staple line and leakage are the main complications that may occur in the immediate postoperative period⁽⁶⁾. The literature describes an average leakage rate of 2.4%, ranging from 1.1% to $4.7\%^{(9)}$. In recent years, several studies have tried to identify factors associated with reduced leakage risk, including the size of the tube used, the distance from the pylorus, the surgeon's experience, and staple line reinforcement⁽⁹⁾.

Regarding this issue, different reinforcement methods have been described, with oversewing the line with absorbable suture and using fibrin sealants being the most common approaches⁽⁹⁻¹¹⁾. The use of fibrin sealants has shown promising results in reducing the rate of complications^(11,12). The aim of this study is to present our series of 116 cases using fibrin sealant solution in laparoscopic sleeve gastrectomy as a method to prevent postoperative leakage.



Material and Method

The series was obtained from the bariatric surgery database of the General and Digestive System Surgery Department at Hospital Royo Villanova in Filemaker® and Excel® formats. Patient data (gender, age, BMI, surgical technique noting the method of staple line closure and the use or non-use of aspirative drainage, modifications of the technique and associated procedures, surgical time, and postoperative complications) were extracted from the unified Electronic Health Record of SALUD ("Servicio Aragonés de Salud").

The fibrin sealant was prepared in all cases at the beginning of the procedure, maintaining it at an approximate temperature of 36 - 37 °C. The application was performed in all cases by spraying it using a laparoscopic applicator through the trocar in the right hand over the upper third of the gastrectomy, after removing the orogastric tube, and after oversewing in case it was performed (Figure 1, Figure 2, Figure 3).

A descriptive analysis of the series and the results obtained was conducted.

Results

From September 10, 2019, to February 28, 2023, a total of 116 patients who underwent laparoscopic sleeve gastrectomy for morbid obesity with the application of fibrin sealant solution were analyzed.

Sample analysis:

The distribution by gender was 46 males (39.65%) and 70 females (60.34%). The mean age was 47.52 years [19 - 66]. The mean BMI was 44.83 [35 - 69]. One patient (0.86%) had a modified standard sleeve gastrectomy technique (laparoscopic sleeve-Nissen). Two patients (1.72%) underwent revision surgery (sleeve gastrectomy on the remaining gastric pouch of biliopancreatic diversion). Two patients (1.72%) had concomitant cholecystectomy, and one patient (0.86%) had diaphragmatic plication. The average duration of the procedure was 59.43 minutes [25 - 190]. 19 patients (16.37%) had postoperative aspirative drainage.

Method of closure for sleeve gastrectomy:

The closure of the sleeve gastrectomy was performed with an automatic stapler (3 staple lines) in 112 patients (96.55%) and with a non-automatic stapler (3 staple lines) in 4 patients (3.44%). In 24 patients (20.68%), continuous



Figure 1 - Laparoscopic fibrin sealant applicator.





Figure 2 - Laparoscopic fibrin sealant applicator.

sutures were added to the staple line, 4 of them performed with the non-automatic stapler, and 20 with the automatic stapler.

Postoperative course:

The average hospital stay was 2.96 days [1 - 9]. Complications included one case (0.86%) of hemoperitoneum upon admission, two cases (1.72%) of vomiting and digestive intolerance in the first 48 hours, and four readmissions (3.44%) in the first week postoperatively due to leakage

at the suture line in the cardia. In all cases of leakage, the closure of the sleeve gastrectomy had been performed with the automatic stapler without reinforcement resuturing.

Discusion

Bariatric surgery is a highly effective treatment for obesity, not only in terms of effective and sustained weight loss over time but also in resolving or improving associated





Figure 3 - Fibrin sealant applied over the staple line in the upper third of the gastrectomy.

comorbidities and enhancing quality of life^(3,4).

Sleeve gastrectomy has become one of the most widely used and adopted techniques globally⁽³⁻⁵⁾. When performed in specialized units by skilled surgeons, it yields excellent results in terms of percentage of weight and BMI lost, as well as comorbidity resolution^(7,8).

Although it is considered technically more accessible than a bypass procedure like gastric bypass⁽¹⁾, due to the absence of anastomosis and its highly standardized nature, it is not without postoperative complications, some of which can be potentially severe or even fatal⁽²⁻⁵⁾. Hence, a proper learning curve and attention to specific details in its execution are crucial for improved safety⁽⁶⁾.

Sánchez Santos et al., in 2016, published the main risk factors to consider to avoid possible complications, especially those that can be identified and mitigated⁽⁶⁾. This group highlights compromised safety when the patient's age is over 65, when there are comorbidities, when the patient takes anticoagulants, smokes, uses an orogastric tube smaller than 40 Fr, the distance to the pylorus is less than 4 cm, and when the surgeon lacks experience⁽⁶⁾.

The group led by Gagner et al. in 2020 concurs with the risk factors described by Sánchez Santos et al., adding the

importance of the possibility of staple line reinforcement^(6,11). Hemorrhage and leakage at the staple line are the main complications reported after sleeve gastrectomy^(3,5,6,8). Different closure methods have been described over time, as well as potential reinforcement systems to reduce the complication rate^(2,9,10). Reinforced staplers, oversewing the staple line with absorbable sutures, and the application of fibrin sealant solution are the primarily described and used techniques^(9,10).

The group led by Gagner et al. in their systematic review shows a significant reduction in leakage rates with reinforced staplers compared to the use of reinforcement sutures, sealants, or no additional measures⁽⁹⁾.

Coskun analyzed a series of 1000 cases of sleeve gastrectomy with fibrin sealant application as a reinforcement method, observing a decrease in the rate of hemorrhage and leakage in their series and considering it a preventive measure against stricture and sleeve torsion⁽¹²⁾.

Chen et al. also published a systematic review concluding that the use of sealants may have favorable results, but it does not significantly impact the reduction of postoperative leakage⁽¹¹⁾.

Our study demonstrates the feasibility of using fibrin



sealant solution after laparoscopic sleeve gastrectomy. Its standardized use minimally increases surgical time and has allowed us to eliminate the use of aspirative drainage, reducing the rate from 100% before the use of the sealant to 16.37% in the described series. However, it does not establish a comparison between the gastrectomy closure methods and other reinforcement systems employed. A comparative study between these variations may be crucial in determining a significant improvement in postoperative complications.

Conclusions

The use of fibrin sealants in laparoscopic sleeve gastrectomy may be a therapeutic option to improve the postoperative leakage rate. In our series, its application has significantly reduced the use of aspirative drainage; however, a comparative analysis with a historical series of laparoscopic sleeve gastrectomies without its use is necessary to demonstrate its efficacy.

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