Evaluations of the results of laparoscopic plication of greater curvature of the stomach together with gastro-ileal anastomosis in the management of morbid obesity.

Ahmed Safaa Ahmed Sayed[1], Arafa Sayed Ahmed Arafat[2], Ahmed Mohammed El sadat[3] ,Tamer Mohammed Nabil[4], Ahmed Mohammed Rashad[5], Abdelhafeez Mohammed Abdelhafeez[6]

[2]M.B., B.CH., M.SC.

[3]Professor of general and pediatric surgery, Faculty of medicine –Beni Suef University.

[4]professor of general surgery, Faculty of medicine – Beni Suef University.

[6]Lecturer of general surgery, Faculty of medicine – Beni Suef University.

[*]**Corresponding author:** Arafa Sayed Ahmed Arafat

Abstract

Bacground: Bariatric surgery seems to be the only intervention with evidence suggesting successful long-lasting (>1year) effects on weight of the body in severely obese cases.

Aim: To assess the results of laparoscopic plication of greater curvature of the stomach together with gastro-ileal anastomosis in the management of morbid obesity 1 year following operation according to %EWL, comorbidities resolution, nutritional status and postoperative complications.

Patients and methods: This prospective research carried on 10 cases of morbid obesity that had SAPI bypass in the duration from May 2019 to May 2020 in the General Surgery Department of Beni Suef University Hospitals, Egypt.

Results: All patients with type II diabetes improved their diabetic state after 12 months of follow-up. The infertile woman became pregnant four months postoperatively. Six patients had complications, including one major gastric obstruction, four hair loss patients, one with nausea and vomiting, and one with biliary reflux. All patients experienced improvement in their diabetic state without hypoglycemic medications.

Conclusion: We concluded that SAPI technique led to significant reduction in weight of the body and body mass index, significant percentage of excess weight loss, and satisfactory enhancement in comorbidities at twelve month following operation.

Key words: Laparoscopic plication, Gastro-ileal anastomosis, Morbid obesity

Introduction

Bariatric operation appears to be the only intervention with evidence suggesting successful long-lasting (>1year) effects on body weight in severely obese patients **(1)**.

Consequently, surgeons continue to investigate for an optimum operation to facilitate loss of weight in patients and thereby elevate expectance of their life and enhance their quality of life **(2)**.

In recent decades, laparoscopic sleeve gastrectomy (LSG) was identified as an efficient and safe method for morbid obesity, facilitating weight loss and decreasing obesity-related comorbidities **(3)**.

Laparoscopic greater curvature plication (LGCP) is a new bariatric method which is comparable to laparoscopic sleeve gastrectomy, utilizing a limited mechanism. But it has been suggested to cases with reduced body mass index and less comorbidities **(4)**.

A primary advantage of the SAPI method is the reduced expenses which may be a crucial factor in resource-restricted countries when choosing the bariatric method. In comparison with additional bipartition method, the SASI bypass, SAPI doesn't relate to the further expenses of five to six cartridges necessary for resection of the stomach, amounting approximately 750–900 US dollars each case. Expenses may be diminished through performing a manual gastro-ileal anastomosis rather than a stapled procedure, hence dispending the expenses of the stapler and cartridge required for the anastomosis; however, additional research is necessary to confirm its safety. It may be arguable that saving the expenses of five to six cartridges with SAPI method may not justify the possibility of prolonged reflux which could require alteration into gastric bypass **(5)**.

This research aimed to assess the results of laparoscopic plication of greater curvature of the stomach together with gastro-ileal anastomosis in the management of morbid obesity 1 year following operation according to %EWL, comorbidities resolution, nutritional status and postoperative complications.

Patients and methods

This prospective research carried on 10 cases of morbid obesity that underwent SAPI bypass in duration from May 2019 to May 2020 at the General Surgery Department of Beni Suef University Hospitals, Egypt.

Inclusion criteria: Cases of morbid obesity in adult over eighteen years of either gender with have been involved. Morbid obesity has been described as BMI above 40 or BMI above 35 kilograms per square meter accompanied by at least one main comorbidity.

Exclusion criteria: Cases of obesity secondary to disorders of endocrine, cases of major psychological disturbances, cases with below twelve months of monitoring have been also excluded, history of laparotomy, previous bariatric surgery, pregnancy or lactation, and patient's unfit for general anesthesia.

Methods

All patients were subjected to the following:

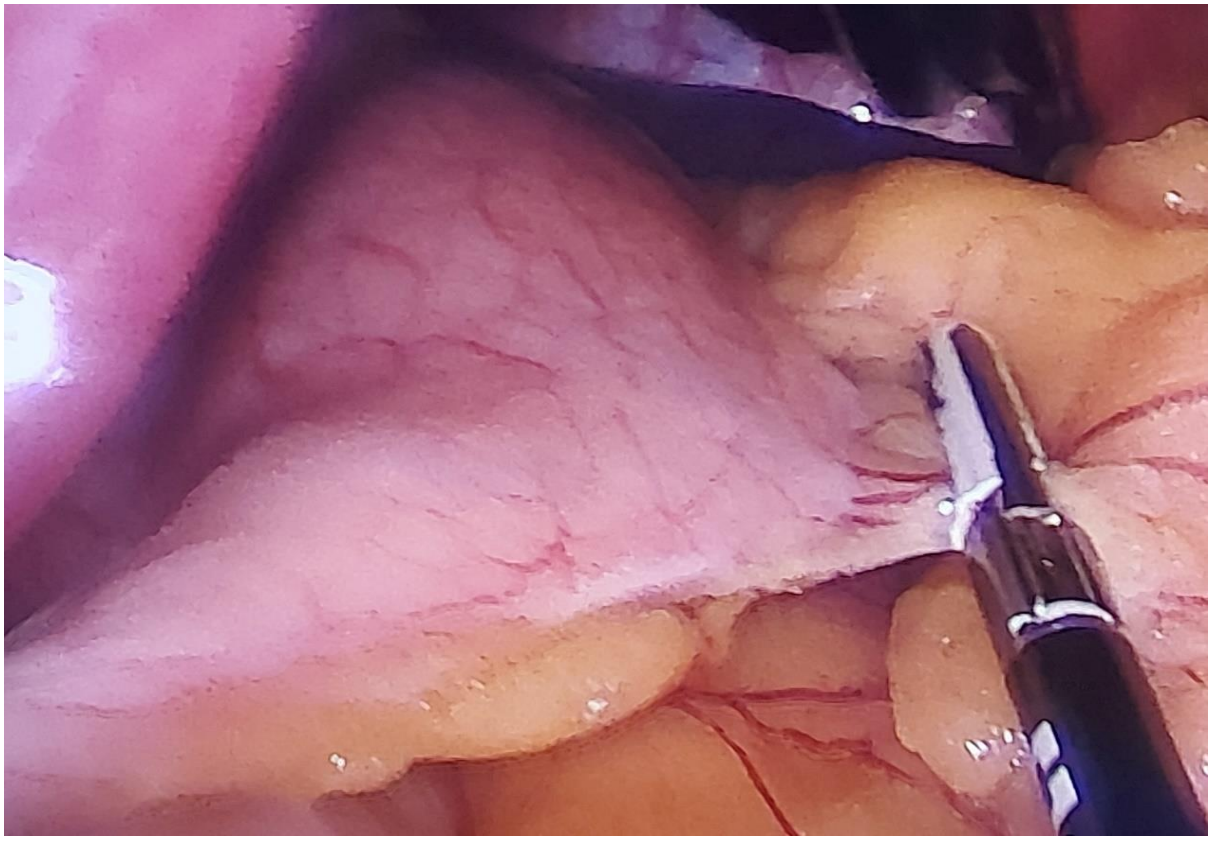
Preoperative preparation

Prophylaxis against venous thromboembolism in the form of wearing elastic stockings and subcutaneous injection of reduced molecular weight heparin (Enoxaparin, 40 IU) at the night prior to operation, continuing for ten days post-operation. Following thorough discussions with cases, written informed consents about the technical aspects and description of the process, emphasizing its new nature, and potential complications and benefits have been attained from the cases. All cases underwent an assessment prior to operation involving careful history taking, clinical examination, and laboratory research involving lipid profile, blood glucose, and an assessment of thyroid hormone. The identification of type 2 diabetes mellitus was depending on fasting blood glucose concentrations above 126 milligrams per deciliter or in cases with a positive history of diabetes who are undergoing treatment of antidiabetes. The subsequent tests have been utilized for the identification of each obesity-related comorbidity: Type 2 diabetes mellitus: Postprandial and

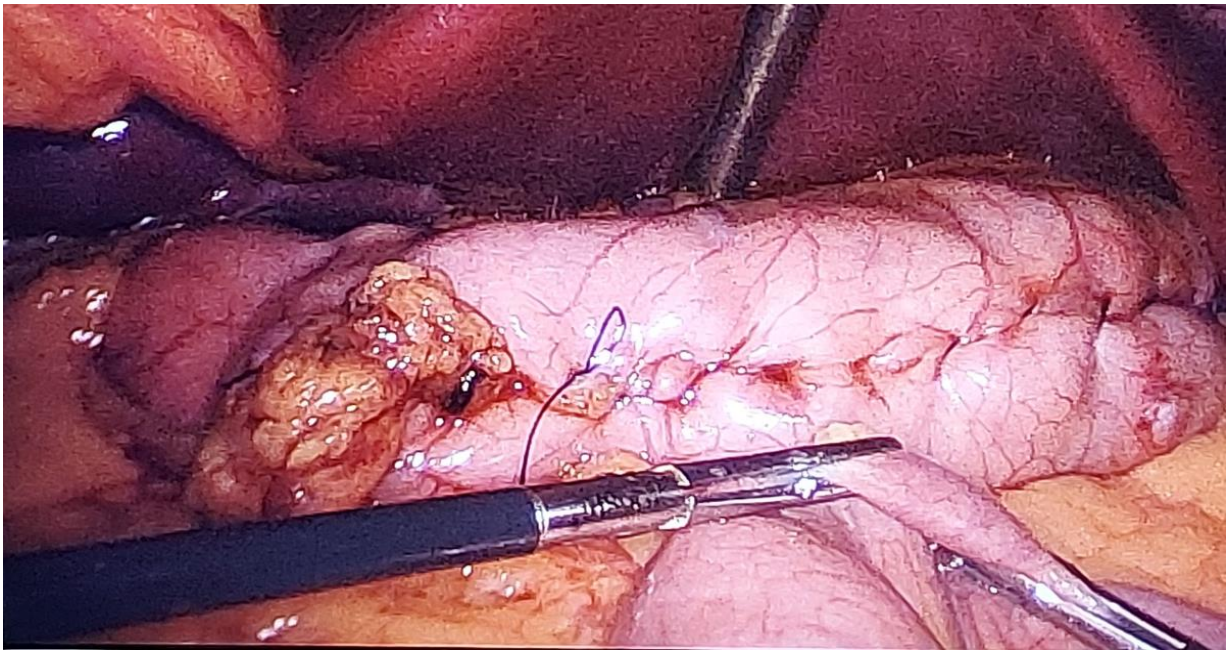
fasting blood glucose and HBA1c; measurement of arterial blood pressure on 3 distinct occasions under resting conditions; hypertension: dyslipidemia: serum concentrations of triglyceride, cholesterol, LDL, VLDL, and HDL level. The liver size has been decreased through maintaining all cases on a reduced-calorie protein diet for two weeks before operation.

Surgical procedure

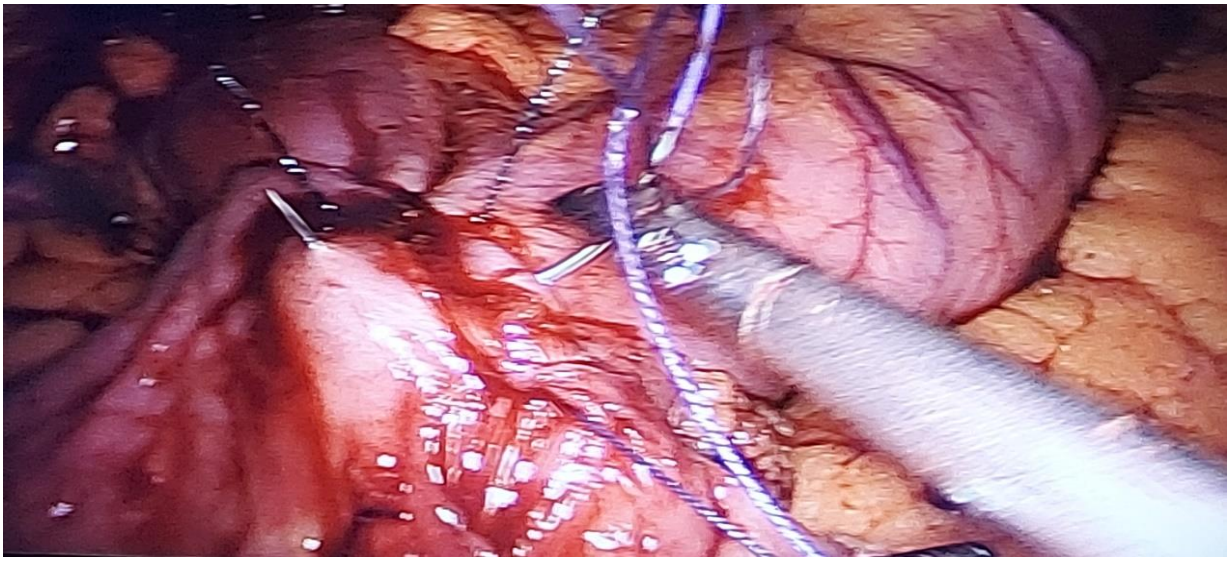
All methods have been conducted via the first author in a standardized manner. Ceftriaxone (1g) has been administered at anesthesia stimulation, followed by pneumoperitoneum at 15 mmHg. Three ports were placed, with an optional fourth port when needed. The greater curvature of the stomach has been dissected utilizing an ultracision harmonic scalpel™, beginning 5 centimeters proximal to the pylorus and extending to the angle of His. A 36 Fr orogastric tube has been introduced, and the greater curvature has been plicated in 2 rows using nonabsorbable sutures. The duodenojejunal junction has been recognized, and 300 centimeters of bowel have been determined distal to it to establish the anastomosis, ensuring a remaining prevalent length of channel of at least 250 centimeters. The ileal loop has been approximated to the anterior gastric antrum, resulting in a stapled isoperistaltic side-to-side gastro-ileal anastomosis 3 centimeters from the pylorus, utilizing a 60 centimeters blue cartridge stapler. The gastroenterostomy has been then closed utilizing barbed suture (V-lock).



Devascularization of the greater omentum of the stomach. (Our study)



Preparing for anastomosis. (Our case)



Gastro-ileal anastomosis. (Our case)

Second layer of greater curvature plication. (Our study)

Figure (1): Shows surgical technique

Outcomes of the study: The primary result of research was a percentage of excess weight loss at six and twelve month following SAPI. Secondary results involved improvement in comorbidities, complications, nutritional status, time of the surgery and hospital stay. Enhancement in comorbidities has been defined regarding standardized outcome recording devised via ASMB **(6)**.

Follow-up

Patients were monitored at various intervals postoperatively, with weight loss as the primary endpoint and comorbidity resolution and malnutrition as secondary endpoints. Nutrient deficiencies were assessed at 12 months, and patients were advised to follow a reduced-caloric, protein-rich liquid diet for the first month, gradually transitioning to a supervised diet. They were advised to take multivitamin supplements and encouraged physical activity. At 12 months, weight, %EWL, and BMI have been recorded, and remission or enhancement of T2DM and comorbidities has been confirmed.

Data collected

The research recorded the information before operation on case age, sex, BMI, initial weight, and obesity-related comorbidities. Information of operation involved intraoperative complications like bleeding and organ injury. Information after operation involved %EWL, BMI changes, early postoperative complications, and prolonged complications beyond a month after operation. The research aimed to understand the effect of obesity on patient outcomes.

Statistical analysis.

Information have been analyzed with SPSS (version 23, IBM corp, Chicago, USA). Continuous information has been represented as mean ± standard deviation (SD) or median and normal range and have been analyzed with unpaired Student's t test. Categorical information has been

represented as numbers and proportions and have been processed utilizing Chi-square or Fisher exact tests. P-values below 0.05 have been considered significant.

Results

Table (1): shows percent of sex in our study.

	Studied group N=10	
	N	%
Sex		
Male	3	30%
Female	7	70%

In our study, there were three male cases (30%) and seven female cases (70%). (Table 1)

Table (2): shows operative time according to frequency of cases below or above 2 hours.

	Studied group N=10	
	N	%
Equal or less than two and half hour	6	60%
More than two and half hour	4	40%

The mean time of operation was 159 ± 12.6 minutes, a minimum 150 minutes, and a maximum 180 minutes. (Table 2)

Table (3): Mean Operative times and mean postoperative hospital stay.

	Studied group N=10				
	Mean ±SD	Median	Range	Minimum	Maximum
One week	159 ±13	150	30	150	180
Five weeks	6±1	6	2	5	7

SD: stands for standard deviation

The mean time of operation was 159 ±13 and the mean hospitalization was 6±1 day. (Table 3)

Table (4): Showing nutritional status one-year post-operatively.

	Studied group N=10		
	Mean ±SD	Minimum	Maximum
1-year Postoperative HB% (11.7-15.5)	11.9 ±0.98	11.0	13.7
1-year Postoperative iron (40-150 ug/dl)	63.75 ±21.84	33.0	92.0
1-year Postoperative calcium (8.5-10 mg/dl)	8.92 ±0.37	8.4	9.5
1-year Postoperative vit D (insufficient 10-29 pg/ml)	21.2 ±8.28	13.0	35.0

1-year Postoperative vit B12 (160-800 pg/ml)	1579.01 ±812.9	153.4	2380.0
1-year Postoperative serum albumin (3.5-5 g/dl)	3.81 ±0.35	3.0	4.2

An insignificant variance among preoperative and postoperative blood sugar concentrations, but a significant variance in iron concentrations and total calcium concentrations. No significant difference was found among preoperative and postoperative vitamin D concentrations p-values above 0.05, but a significant variance has been observed in vitamin B12 concentrations and serum albumin concentrations. The study suggests that these factors may influence the outcome of the surgery p-values below 0.05. (Table 4)

Table (5): demonstrates frequency of comorbidities (pre & post-operatively).

	Studied group N=10	
	N	%
Preoperative comorbidities		
Present	10	100%
On year Postoperative comorbidities		
Absent	10	100%

At twelve months of monitoring, all cases with T2DM experienced an enhancement in the diabetic state. They underwent fasting blood glucose below 100 milligrams per deciliter or HbA1C level below six percent without hypoglycemic medications. Two cases of hyperlipidemia underwent average lipid profile without drugs, and two cases of hypertension underwent normal blood pressure without antihypertensive medications, and patient with back pain experienced an improvement in pain. The infertile woman got pregnant 4 months postoperatively. (Table 5)

Table (6): show frequency of post-operative complications.

	Studied group N=10	
	N	%
Fundul obstruction	1	10%
Hair loss&nausea and vomiting	4	40%
Biliary reflux	1	10%

Six patients were complicated in this study, one major complication and five minor complications. One patient was complicated by gastric obstruction treated by reoperation, undo plication at midgastric point and then replication without narrowing. Four patients complicated by Hair loss & nausea and vomiting: Nausea and vomiting presented within first two weeks, resolved conservatively, but Hair loss appeared after four months and was treated conservatively. One patient complicated by biliary reflux five months postoperatively and treated conservatively. (Table 6)

Discussion

Our study included three males (30%) and seven females (70%).it does not differ a lot from the prospective study of **Elbanna and colleagues (5)** in which the number of patients is 56 divided to 48 females (85%) and 8 males (15%).

The mean age of cases in our research was 35.30 ± 8.8, a minimum of 26 years and a maximum of 58 years. **Elbanna H et al. (5)** had reported that the mean age of cases was 37.3 years in their prospective study including 56 patients who underwent SAPI procedure.

According to hospital stay: In our study, the mean hospital stay is (6±1) day, range (5-7 days).

In another study, **Elbana H et al. (7)** reported that the medium hospital stay of SAPI procedure is one day.

In comparison with plication: Grubnik VV et al. (**8)** reported that mean hospitalization of plication is 3.8±1.7 days.

According to operative time: In our study, the mean time of operation was159±12.6 minutes, ranged between 150 and 180 minutes.

In comparison with plication: The mean time of operation was 73±19 minutes as reported by Grubnik and colleagues **(8)**.

According to remission or improvement of comorbidities

Remission of T2DM has been described as a fasting plasma glucose concentration below110 milligrams per deciliter or HbA1C concentration below 42 mmol/mol without hypoglycemic drug at twelve month following operation. Enhancement in type 2 diabetes mellitus has been characterized as a decrease of at least twenty-five percent in the fasting plasma glucose concentration and of at least one percent in the HbA1c concentrations with hypoglycemic drug therapy **(6)**.

At 12months of monitoring, all cases with T2DM experienced an enhancement in the diabetic state. They underwent fasting blood glucose below hundred milligrams per deciliter or HbA1C level below six percent without hypoglycemic medications. Two cases with hyperlipidemia underwent average lipid profile without medications, and two cases of hypertension underwent normal blood pressure and stopped taking medications of antihypertension, and patient with back pain experienced an improvement in pain. The infertile woman got pregnant 4 months postoperatively.

In a prospective study, including 56 patients who had undergone SAPI procedure, **Elbanna H et al. (5)** had reported that at twelve months of monitoring, all cases with type 2 diabetes mellitus experienced either enhancement (2; 14.3%) or remission (12; 85.7%) in the diabetic state, medications at twelve months following operation. Nine of the 11 (81.8%) cases with hyperlipidemia underwent normal lipid profile without drugs and seven (77.8%) of the nine cases of hypertension underwent normal blood pressure without drugs of antihypertension.

In comparison with plication: In a systematic review and meta-analysis involving 2071 patients in14 studies, to evaluate the impact of surgical gastric plication on obesity and T2DM**, Meyer HHG et al (9)** had reported that after one-year Glycated hemoglobin (HbA_{1c}) values diminished by up to 5.1% following operation, ranging from 5.1% to 7.5%.

In a current research **Gudaityte et al. (10)** reported that among nineteen cases with diabetes before operation, the HbA_{1c} values reduced from 7.8 to 6.8 after three years (p-values equal 0.001). In this sample size, 72.3% of cases with diabetes before operation attained either enhancement or remission following operation, with 27% of cases attaining remission from type 2 diabetes

mellitus. Additional comorbidities also developed following operation, with 38.3% attaining remission and 29.8% demonstrating enhancement in hypertension.

According to post-operative complications

In our study**,** no mortality. Six patients were complicated, one major complication and five minor complications. One patient was complicated by gastric obstruction presented with vomiting not respond to treatment 2 months postoperatively, the upper GIT endoscopy had reported that retained food and large plicated fold obstructing the lumen at the incisura angularis, slim gastroscope can pass to pyloric ring with difficulty, so the patient had undergone reoperation, undo plication at midgastric point and then replication without narrowing. Four patients complicated by Hair loss & nausea and vomiting: Nausea and vomiting presented within first two weeks, resolved conservatively, but Hair loss appeared after four months and was treated conservatively. One patient complicated by biliary reflux five months postoperatively and treated conservatively. None of cases improved stomal ulcers. These two complications, including biliary reflux and stomal ulcers, reported following bipartition processes, are at reduced rates as the largest research on SASI bypass indicated biliary vomiting in below 6 percent of cases and stomal ulcers in 0.5 percent of cases **(11)**. Furthermore, these complications have been adequately managed conservatively, without the requirement for surgical intervention or revisions **(5)**.

In comparison with plication: It does not differ a lot from what reported by **El Soueidy and colleagues (12) i**n their Systematic Review in which minor complications involving nausea, sialorrhea, vomiting, and gastrointestinal hemorrhage that resolved within few days with conservative treatment. Some cases of persistent vomiting required readmission for treating dehydration and electrolytes imbalance.

According to changes in nutritional status: In our study, 1year postoperatively, nutrient deficiencies have been reported in three cases, two patients of iron deficiency anemia which were corrected by supplementation of iron, one case of hypocalcemia and has been corrected by oral calcium tablets, and one case of mild hypoalbuminemia which was corrected by protein intake. It does not differ a lot from what reported by **Elbanna et al. (5)** in their prospective study including 56 patients in which nutrient deficiencies have been reported in three cases, one case improved anemia which has been corrected with oral iron supplementation, one case underwent hypocalcemia and has been corrected with oral calcium tablets, and additional woman case complained of advanced loss of the hair at four month following operation that was secondary to deficiency of zinc that has been corrected with oral zinc supplementation.

Conclusion

We concluded that SAPI technique led to significant reduction in weight of the body and body mass index, significant percentage of excess weight loss, and satisfactory enhancement in comorbidities at twelve month following operation.

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