

Quality of Life after Laparoscopic Roux En Y by Pass Versus Laparoscopic One Anastomosis Gastric by Pass Seven Year after Surgery in a Single Center

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1. Abstract

1.1. Objective: The aim of this study is to compare the results between the Laparoscopic One Anastomosis Gastric Bypass (LOAGB) to the Laparoscopic Roux en Y Gastric Bypass (LRYGB) on the post operative course, excess weight loss (EWL) and quality of life (QoL) with an experience of seven years of routine practice of LOAGBP in a single center.

1.2. Methods: 846 patients have undergone a LRYGB (group 1) and 1048 patients have undergone an LOAGB (group2). Data were collected with dedicated software on all consecutive patients (post operative course, weight and BAROSCORE) on a periode of seven years after the first procedure of LOAGBP. We extracted undergroup of each group with follow up over 4 years and study and compare the mean EWL and mean QoL.

1.3. Results: Median age at the time of surgery was 40±0,41 in group 1 vs 41±0,37 in group 2 (ns). Median Body Mass Index (BMI) was 43±0,36 in group1 and 44±0,29 in group 2 (ns). The median length of surgery and the median length of hospitalisation were more shorter in group 2 (152 min vs 118 min, 8,9 days vs 4,5 days). Patients in group 2 present less gastric ulcer perforations (1,8% vs 0,3%) and occlusions (2,2% vs 0,2%) than group 1. There are more gastro oesophageal reflux in group 2 than group 1 (0,8% vs 0%). It seems to be have more vitamin moderate deficit in group 2 than group 1 (61% vs 44%). There are no difference on the lost of weight (mean weight loss of 38 kg in group 1 vs 39 kg in group 2), but there are more good, very good and excellent score after baroscore on group 2 than group 1, and less failure and fair QoL in group 2 than group 1.

The study of undergroup with follow up over 4 years, shows better results on EWL and QoL after LOAGBP.

1.4. Conclusions: The LOAGB shows improvement the immediate outcome of surgery and the long term follow up show less complication than LRYGBP, with an improvement of quality of life and EWL, at the expense of more vitamin moderate deficit.

It seems exits less perforated ulcer and bowel occlusion after LOAGBP than LRYGBP.

2. Introduction

Severe obesity is one of the major problems in Western Countries and is associated with several comorbidities and disabling diseases (e.g., cardiovascular disease, metabolic syndrome, type 2 diabetes, fertility, cancers and increased mortality).

For severe obesity, the treatment of choice is surgical, and the gastric bypass with roux en Y loop was considered like the gold standard [1].

The goal of surgery is also the weight of loss, the resolution of co-morbidities associated and also an improvement of quality of life (QoL).

But this surgery was considered like complex and not easy to performed, with potentially lethal complications.

The goal of this study was to compare the operative outcome and the long term QoL between two procedures, the laparoscopic Roux en Y gastric bypass (LRYGBP) and a procedure more recent, described by Rutledge and al in 2001 [2], the laparoscopic one anastomotic gastric bypass (LOAGBP).

3. Materiel and Methods

This is a retrospective study in single center (Clinique du Tondu, Bordeaux, France) from september 2004 to december 2016 with a prospective data collectors.

All patients were evaluated for surgical treatment of morbid obesity
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sity by a multidisciplinary and integrated medical unit, (C-TOP) including bariatric surgeon, general physician, endocrinologist, psychiatrist, and dietician.

A thorough assessment was performed of each patient's general condition and mental status, complications of obesity, risk factors, and motivations for surgery.

The inclusion criteria followed those of French Health Authorities (HAS) were :

- a history of obesity of 5 years' duration;
- BMI = 40 kg/m² or BMI = 35 kg/m² with comorbidities;
- documented weight loss attempts in the past;
- no indications against the surgery;
- and good motivation for surgery.

All the patients after surgery (LRYGBP or LOAGBP) were retrospectively review and all the data was collected in a prospective data base (weight, body mass index-BMI, co-morbidity, quality of life-QoL and re-intervention).

There are no randomisation between the two groups, the patients with antecedents of oesophagitis or hiatal hernia on fibroscopy before surgery have preferentially a LRYGBP.

Two undergroups were created by extraction of the data of each group with the inclusion criteria, a follow up over 4 years.

3.1. Surgical Technique

- Laparoscopic Roux-en-Y Gastric Bypass

The technique used for LRYGBP was performed with gastro-jejunal manuel anastomosis, jejuno-jejunal mechanical anastomosis.

A gastric tube was created using an endoscopic stapler (EndoGia® Covidien, Echelon® Ethicon) approximately above the second vessel of lesser curvature of the gastric pouch.

The gastric pouch was straight calibrated with faucher tube 36 French.

The jejunum was divided 100 cm distal to the ligament of Treitz. A stapled end-to-side jejunostomy anastomosis was performed with a 100-cm Roux limb for all the patients independantly of initial BMI.

The Roux limb was positioned via an antecolic path . All the peritoneal defects was closed. All the staple line was reinforced with oversewing by Monocryl® 2/0 Ethicon .

- Laparoscopic one anastomotic Gastric By pass

A long gastric tube was created using an endoscopic stapler approximately at the junction of horizontal and vertical part of the lesser curvature.

The gastric pouch was long and straight calibrated with faucher tube 36 French.

A loop gastroenterostomy was created with the small bowel about 150 cm distal to the ligament of Trietz with a manual anastomosis.

All the staple line was reinforced with oversewing by Monocryl® 2/0 Ethicon .

3.2. Post Operative Care

All of the patients received care under a standard clinical pathway. The nasogastric tube was removed in post anesthesia care unit in both groups, and patients were encouraged to ambulate as soon as they felt comfortable. Oral feeding was allowed starting on the third postoperative day provided the patient had flatus passage and a normal gastro- grafin contrast study.

Patients were discharged on the seven postoperative day if they felt able to return home. Postoperatively, patients were followed up by the aforementioned multidisciplinary team, and outpatient clinic visits were scheduled one month after discharge hospital and every 3 months there after, and once by year afyer the first year.

Patients were advised to take a daily multivitamin tablet and iron as a supplement. Radiology or endoscopy examination was scheduled if clinically indicated.

A complication was defined as the occurrence of an unexpected medical event that made departure from clinical pathway necessary.

An operative morbidity or early complication was defined as a complication that occurred within 30 days postoperatively.

A major complication was defined as a complication that required interventional management and hospitalization for more than 14 days.

Complications related to the operation that occurred more than 30 days postoperatively and required readmission were defined as late complications.

3.3. Instrument Selection

The follow up was organised with a surgical and medical visit of control each 3 month the first year, and one visit of control by the surgeon by year every year with a nutritional and vitamin status with a dosage albumin and prealbumin, hemoglobin, ferritin and iron saturation coefficient of transferrin, serum calcium, vitamin D, B1, B9 , B12, zinc.

For the postoperative outcome evaluations we used the Bariatric Analysis and Reporting Outcome System (BAROS) [3].

The BAROS questionnaire uses a standardized scoring system to evaluate various outcomes of bariatric surgery such as weight loss, comorbidities, and QoL.

Weight loss is analysed as change in BMI, percent total weight loss (%TWL) and percent excess weight loss, with the calculation of ideal body weight as that equivalent to a BMI of 25 kg/m². Changes in medical conditions related to obesity are analyzed based on resolution or improvement of major and minor comorbidities. The major comorbid conditions taken into consideration by BAROS are hypertension, cardiovascular disease, dyslipidemia, type II diabetes, sleep apnea syndrome, and osteoarthritis. The minor co-

morbid conditions include lower extremity venous stasis disease, gastroesophageal reflux, and urinary stress incontinence. Medical disorders are considered “resolved” when controlled without medication and “improved” when controlled by reduced doses of medication.

Six items are used in the questionnaire for measuring a patient’s subjective impression of QoL in the areas of: general self-esteem, physical activity, social contacts, satisfaction concerning work, pleasure related to sexuality, and focus on eating behavior. Points are added or subtracted based on the patient’s responses. The results of this questionnaire are then incorporated into the BAROS to determine the final score.

The number of points for each area are then summed and classified as failure, fair, good, very good, or excellent outcomes.

The shows the Baroscore.

The result on QoL was distinguished between bad results (failure and fair results) and good results (good, very good and excellent results).

Also we realised a non parametric test to compare the baroscore after a minimal follow up of 4 years, between the two groups, and we compare the % EWL.

All the data were incorporated in a data base

3.4. Statistical Analysis

The results are expressed as median and range. The Fischer’s exact test and the Mann-Whitney U-test were used for two-group comparisons of nominal and continuous variables, respectively, that were not normally distributed. All tests were two-sided. The level of significance was set at $P \leq 0.05$. Statistical analyses were performed using the programme

StatView (SAS Institute Inc., Cary, NC).

4. Results

From november 2004 to december 2016, 1894 patients were included in the study, with 846 patients underwent a LRYGBP procedure (group 1) and 1048 patients underwent a LOAGBP procedure (group 2).

The table 1 summarises the characteristics of each group.

There are no differences between the two groups for the age, the two groups are similar for the initial body mass index.

In the group 1 there are less man than the the omega loop group, and there are more redux surgery for fail prior surgery like gastric banding or sleeve gastrectomy.

The health status with co-morbidity before the surgery is resumed on table 2.

The health status was not similar in the two groups. The presence of « metabolic syndrome » is more frequent on the group 2, but high blood pressure, depressive syndrome, and absence of comorbidity are similar.

The lenght of surgery, the lenght of hospitalisation and adverse events was consigned in table 3. The lenght of surgery and hospitalisation is less longer after LOAGBP than LRYGBP. There are less adverse event after LOAGBP than LRYGBP.

The late complications are scheduled on table 4.

The results after a minimum follow up over of 4 year after the surgery on QoL with baros are scheduled on table 5 for each group. After a follow up over 4 years, we find 92 patients after LRYGBP in the group 1 and 87 patients after LOAGBP in the group 2. The results on QoL are better after LOAGBP than LRYGBP, the results is better on the % EWL.

Table 1: Description of two groups and initial BMI

	Group 1, (n=846)	Group 2, (n=1048)	p value
Age (range)	40 (0,41)	41 (0,37)	ns
Sex male (%)	136 (16%)	203 (19,4%)	0,07
Initial Body mass index	43 (0,36)	44 (0,3)	ns

Table 2: Co-morbidity before the surgery

	Group 1, (n=846)	Group 2, (n=1048)	p value
High blood pressure (%)	275 (33)	274 (33)	ns
Coronaropathy (%)	14 (1,7)	11 (1,3)	ns
High cholesterol (%)	257 (31)	331 (40)	<0,001
Hypertriglyceredemia (%)	167 (20)	280 (33)	<0,001
Diabetes (%)	169 (20)	227 (27)	0,0015
Sleep apnea (%)	122 (15)	190 (23)	<0,0001
Depressive syndrome (%)	121 (15)	96 (11)	ns
No comorbidity (%)	207 (25)	238 (28)	ns

Table 3: Post operative outcome

	Group 1, (n=846)	Group 2, (n=1048)	p value
Lenght of surgery (min)	152 (21)	118 (23)	0,05
Lenght of hospitalisation (days)	9,1 (1,8)	4,5 (2,7)	0,05
Conversion to laparotomy (n=0)	0 (0 %)	0 (0 %)	NA
Reoperation (%)	73 (8,5 %)	37 (3,5 %)	<0,001
Bleeding or hemorrhage (n=30)	16 (1,9%)	16 (1,5 %)	0,6
Small bowel obstruction (n=9)	3 (0,37 %)	6 (0,6 %)	0,5
Anastomotic leak (n=7)	6 (0,7 %)	1	<0,001
Intraabdominal abscess (n=10)	6 (0,7 %)	4 (0,4 %)	ns
Rhabdomyolyse (n=2)	1	1	1
Deep thrombus (n=16)	10 (1,2 %)	6 (0,6 %)	0,2
Death (n=2)	1	1	ns

Table 4: Late complications

	Group 1, (n=826)	Group 2, (n=836)	p value
Marginal ulcer (n=53)	29 (3.4 %)	24 (2.3 %)	0,16
Ulcer Perforation (n=18)	15 (1,8%)	3 (0,3%)	0,0012
Stricture anastomotic (n= 45)	25 (3 %)	20 (2 %)	0,17
Occlusion (n= 25)	23 (2,7 %)	2	<0,0001
Gastro eosophagal reflux (n=9)	0	9 (0,9 %)	0,0055
Severe anemia (n=53)	28 (3,3%)	25 (2.4 %)	0,26
Severe hypoproteidemic (n= 9)	6 (0,7 %)	3 (0,3 %)	0,34
Severe hypoglycemia (n=14)	5 (0,6 %)	9 (0,9 %)	0,6
Severe deficit vitamin B1 (n= 3)	3 (0,3 %)	1	0,12
Mild deficit(B, D, Fe, Ca) (n=855)	406 (48 %)	806 (82 %)	0,0001

Table 5: Weight and BMI four years after surgery

	Group 1, (n=846)	Group 2, (n=1048)	p value
Patients with follow up over 4 years	92	87	ns
Median follow up (years)	6,6 (4 to 12,7)	5 (4 to 7,8)	P<0,0001
Score of QoL	1,75 (-3;3)	2 (-2 to 3)	P=0,034
% EWL	60 % (1 % to 127 %)	70 % (32 % to 156 %)	P=0,0005
Number of lost to follow up over 4 years	400	387	ns

5. Discussion

Bariatric surgery has been proven to be an effective approach for the treatment of morbid obesity in adults with BMI > 40 kg/m² [4], but this surgery had knew end know many evolutions of the surgical technique, and now there are two techniques who represents the most of surgery actually (gastric bypass and sleeve gastrectomy) [5].

The perception of bariatric surgery changes in french society, with an evolution in the distribution of men in our study.

We explain the differences of proportion of men in the omega group, because we performed LRYGBP first (2004 to 2010), and the LOAGBP was essentially performed after (2010 to 2016), and the perception of the bariatric surgery, initially was not considered like an effective treatment for ma, instead the the perception of obesity was not considered like a disease initially. This fact was shown in one study [6] and men were significantly less likely than

women to have seriously considered undergoing surgery.

Weight misperception is highly prevalent for the man [7]. (This fact was shown in United States).

In the group 2, the proportion of patient with one or more comorbidity is more important, especially diabetes, sleep apnea, hypercholesterolemia, hypertriglyceridemia, and we explain this fact, the bariatric surgery is becoming an alternative treatment to control and improve these pathologys, also the general practitioner suggest to the patient this treatment.

The Gastric By Pass with omega loop was first described by Rutledge and al [8], this technique with simplification of the procedure, without jejun-jejunal anastomosis, seems to be easier, faster, and improve the immediate outcomes of the surgery [8–10]. In our study, this fact was shown with less lenght of surgery, (less thirty minutes), and also immediate outcome of surgy with less adverse event.

In our study, the length of surgery is relatively longer than other team with similar high volume of surgery (about 250 procedure each year), but in our team, all the anastomoses were manual, all peritoneal defects were closed and each stapler line was reinforced by oversewing, to minimize the risk of bleeding, although many studies show no clear benefit of reinforcement [11–13].

There are more anastomotic leaks in our study in the group LRYGBP, we explain this fact by a learning curve for the realisation of manual gastro jejunal anastomosis, and initially, we realise only LRYGBP.

The length of hospitalisation stay is also significantly shorter (more short of two days) in case of omega loop, in fact there are less adverse events and also the mean length of hospitalisation is more shorter in case of LOAGBP than LRYGBP.

This length can be considered longer than other study about bypass surgery [14–16], in fact after the immediate outcome of surgery, after the discharge of surgery unit, the patient stays at the hospital, and the medical unit initiates the four primary days of re-alimentation, to initiate this with the best advice for his new life hygiene [17].

Furthermore we considered in case of adverse event, the quick detection of this event with medical team use to this event enable a fast and appropriate support to this event. Delays in treatment, including patient delay, after symptom development were associated with adverse outcomes [18]. Currently we are using a preparation to lead to the surgery with therapeutic education, this preparation contains and describes the usual follow up and seems to lead a discharge hospital after one or two days of hospitalisation. This therapeutic education contains equally and prepares the come back of patient at home with anticipate communication with private nurse.

In our study, the long term result with an experience of four years after LOAGBP shows difference on the loss of weight, and a similar improvement of comorbidity. Many other teams shown similar results on the two groups fact [19–22], or best results on weight loss after LOAGBP [23]. The mean BMI four years after the surgery is 25 in LOAGBP and 27 in LRYGBP.

There are an improvement in quality of life after LOAGBP than LRYGBP, we can explain this fact with less adverse event immediately after the surgery and less adverse event at long time. The extended preparation begin in 2011 can be contribute to this better result also.

Therefore, our study show an improvement of immediate outcome after the surgery in case of LOAGBP, this fact was shown on other study [8–10, 20–22, 24, 25], this is the consequence of less time of surgery, with an easier procedures, without jejuno-jejunal anastomosis, this anastomosis can be the cause of internal hernia in outcome of surgery with worst closure defect or sometimes one or two year after the surgery [26] (more internal hernia with retrocolic procedure than antecolic [27]).

This occlusion can be avoid with closure defect [28], but the risk of internal hernia can be appear with the loss of weight and the mesentery thinning [29].

Furthermore the risk of internal hernia decrease with LOAGBP, and there are no internal hernia with this procedure except the case of reoperations for incarcerated herniation of small bowel in the trocar wound, in four cases in our study, other team described this fact [21], effectively, the small bowel (biliary limb) is opposite of trocar wound.

Also naturally to avoid this event, we closed by laparoscopy this trocar wound at the end of surgery.

Furthermore, it seems to exist the same proportion of marginal ulcer between the two procedures, but there are less perforation in the LOAGBP, we can explain this fact by the presence of alkaline biliary reflux in the gastric pouch and the acidity inactivation.

We find the same rate of ulcer perforation instead the study of Mahawar and al [30]. This study described a rate of 0,2 % of perforated ulcer and 2,4 % of marginal ulcer after LOAGBP on retrospective and multicenter study on 20 000 patients after LOAGBP.

A hypothesis to explain the more proportion of ulcer perforation in the group LRYGBP was the fact in our procedure to built a narrow gastric pouch. The volume of gastric pouch could lead to more acidity of them, and also this acidity can't be neutralised by the alkaline biliary-pancreatic secretion. In fact, our results are similar for the proportion of marginal ulcer and ulcer perforation of LRYGBP on the literature facts [31–33].

This differences can be result of a best education and preparation of the patient of the outcome and better knowledge of them of the outcome of the bariatric procedures.

In the other hand the presence of biliary reflux still subject for controversies. Since the first description of the LOAGBP procedures, it's still a controversies about the possibility of improve a biliary reflux and the long term risk of cardiac and oesogastric cancer [34,35].

In our study, there are no cases of cancer of remnant gastric pouch or cardia and low oesophagus, all the patients were monitored before the surgery for diagnostic of infection by helicobacter pylori.

There are no cases of cancer on the gastric pouch and anastomosis gastro-jejunal after LOAGBP. This fear is the consequence of animal study, and without Roux en y limb in the animal models and in vitro, analyses of chronic alkaline reflux suggest a carcinogenic effect [36]. This reproach was know with the Billroth 2 reconstruction, after a long term follow up [37,38], but there are no correlation between remnant gastric cancer and reconstruction technique in the study of Morgani and al [38], this study compare the result after primary gastrectomy for gastric cancer and no benign disease.

Four patients present a severe bile reflux and need a conversion to LRYGBP by staple the afferent loop and latero-lateral jejuno-jejunostomy. The post operative outcome for this conversion was

good, with all simple post operative and a hospital discharge of 2 days for each patient.

This fact was described by other authors and still rare. Noun and al [25] described 4 patients (0,4 %) after one thousand LOAGBP for severe bile reflux, Musella and al [22] on 818 patient described no conversion to LRYGBP on the ground of bile gastritis, but the bile gastritis was symptomatic on 8 patients (0,9 %) on his study.

Also for our team, we can't consider the risk of biliary reflux like an argument against LOAGBP, the risk exists, but still rare and can be controlled easily and with a simple conversion to LRYGBP.

In our experiences it seems to exist more iron deficit after LOAGBP than LRYGBP, with lower hemoglobin in LOAGBP group but without significant differences. The iron deficit is not rare in LRYGBP and it was described [39], but there are not described in LOAGBP.

The iron deficit in our experiences seems to be more important after LOAGBP than LRYGBP, with the use of more intravenous iron therapy.

This iron deficit can explain more anemia in LOAGBP [23].

We scheduled the ferretin level, before the surgery and four times by year the first year after and one times by year after. All patients have iron supplementation with IRON SULFATE (ACTIFERYL CODIFRA®) 14 mg by day, during 6 month after the surgery to prevent this deficit.

It seems to exist more minor deficiencies of vitamins after LOAGBP, without use of intravenous supplementation or hospitalisation.

6. Conclusion

The goal of this study was to compare the results on QoL between LRYGB considered like the

« gold standard » and the LOAGBP, a recent procedures still controversies.

On long term over 4 years, it seems exists a difference on EWL and QoL in favour of LOAGBP. Furthermore our study shown a better outcome of surgery and less adverse event, for a better weight of loss than LRYGBP.

We shows less ulcer perforated and less occlusion after LOAGBP than LRYGBP, it seems to be the first description of this fact, furthermore study will be necessary to confirm or not this fact.

It still controversies on an potential risk of oesogastric carcinoma with chronicle bile reflux, but this fact was suspected before the knowledge of infection by helicobacter pylori and is not clearly proved.

All this fact made us prefer LOAGBP, and these fact explain the current preference actually of more and more surgeons.

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