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RESEARCH ARTICLE

GASTRIC MUCOSAL CHANGES IN DUODENAL SWITCH OPERATION IN MANAGEMENT OF MORBID OBESITY: PRE- AND POST-OPERATIVE COMPARISON.

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Abstract

Objectives: Duodenal switch has proved to be the most effective procedure in management of morbid obesity as it has long-term weight loss outcome and co-morbidity improvement. It is important to study the types of abnormal histopathologic pattern in the gastric mucosa in patients with duodenal switch operation and follow up of those changes 6 month after the operation

Methods: 25 morbidly obese patients were included in this study. All patients were treated in the Endocrine Surgery Unit (ESU), Mansoura University Hospitals.

All patients did duodenal switch operation (single anastomosis duodeno-ileal bypass with sleeve gastrectomy) and a biopsy from their gastric mucosa was taken at the time of the operation. Follow up of those patient was done six month after surgery regarding body weight, body mass index, weight loss and a biopsy was taken by upper gastrointestinal endoscope and compared with the previous data

Result: The mean body weight six month after the operation was 116.2 ± 15.2 kilo grams in comparison with 156.8 ± 14.9 kilo grams at time of surgery with mean weight loss about 40.6 kilo grams and the mean body mass index six month after the operation is 40.7 ± 4.4 in comparison with 55.0 ± 4.7 at time of surgery with mean body mass index loss about 14.

Normal gastric mucosa increased to 12 cases (48%) six month post-operative in comparison to seven cases (28%) at time of operation and Pathologic gastric mucosa decreased to 13 cases (52%) six month post-operative in comparison to 18 cases (72%) at time of operation

Conclusion: Open duodenal switch operation (Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy) for morbidly obese patients gives very good results in weight loss and control of diabetes mellitus type II and hypertension. As regards the epithelial changes after surgery it was noticed that there were improvement of the gastric mucosal pathology.

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Introduction:-

Obesity is an excess of body weight that frequently results in a significant impairment of health and it happened when there is increase in the number or size of fat cells in the body. A normal person has 30 to 35 billion fat cells.

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When a person gains weight, the fat cells increase in size at the first and then in number. (1). Obesity is a serious health problem all over the world where there is more than 1.9 billion adults who are overweight, of which 600 million are obese. (2). In the Eastern Mediterranean region, there are the highest levels of overweight persons (BMI ≥ 25) were in Kuwait, Egypt, Saudi Arabia, United Arab Emirates, Jordan and Bahrain, where the incidence of overweight and obesity for those aged more than 25 years was between 74%–86% for women and 69%–77% for men (3). The etiology of morbid obesity is multifactorial and is those include genetic, metabolic, socio-cultural, physiological, and psychological factors (4). With morbid obesity there is increased risk of co-morbidities as: type two diabetes, hypertension, hyperlipidemia, coronary artery disease, and shorter lifespan (5). Non surgical treatment of obesity (physical activity, diet control, life style modification and pharmacotherapy) seems to be ineffective with morbidly obese patients (body mass index more than 40), or those with body mass index 35–39.9 with associated co-morbidities. Such patients should undergo bariatric surgery either restrictive (as laparoscopic sleeve gastrectomy or malabsorptive surgery (as single anastomosis duodeno-ileal bypass and Roux-en-Y gastric bypass). (6). In recent years, bariatric surgery is the most powerful tool for management of obesity and related co-morbidities. (7). Bariatric surgical procedures are divided into restrictive, malabsorptive, and combined (both restrictive and malabsorptive procedures). Commonly performed techniques include: Adjustable Gastric Banding (LAGB), Laparoscopic Sleeve Gastrectomy, Roux-en-Y Gastric Bypass, Bilio-pancreatic Diversion , and Bilio-pancreatic Diversion with Duodenal Switch (8). Laparoscopic sleeve gastrectomy was first done in 2000, as part of a duodenal switch operation. (9). Long-term results of sleeve gastrectomy alone indicate that up to 64% of patient present insufficient weight reduction and 70% of them present with weight regain, despite proper preoperative management and selection (10). Single anastomosis duodeno-ileal bypass with sleeve gastrectomy which is done by single loop duodenal switch with a 200-250 common channel. It has benefits over Roux-en-Y Gastric Bypass (which is considered by many authors to be the gold standard bariatric surgery) :half number of anastomosis, preserved pylorus that controls gastric emptying, no dumping syndrome, reduction of operative time and possible lower rate of postoperative complications (11). Duodenal switch operation has proved to be the most effective bariatric operation in terms of the long-term weight loss outcome and high cure rate for co-morbidities. However, its technical difficulty has limited its widespread use. (12). All mal-absorptive procedures as duodenal switch usually require strict nutritional supplementation especially postoperatively as most of the Intestinal tract is bypassed. So it is important for lifelong follow-up of those patients, and follow up of nutritional-related abnormalities. (12). The European and Italian national guide lines recommend the use of pre-operative endoscopy (upper gastrointestinal endoscopy) plus multiple biopsies in the work-up of patients, the guidelines of the American Society for Metabolic and Bariatric Surgery recommended it only in selected cases with Symptomatic gastric disease. So The Upper gastro-intestinal endoscopy is very Helpful in properly informing the patients and discussing the Type of surgery and the need for concomitant surgical procedures (i.e.,hiatal hernia repair) and presurgery medical treatment (Helico Bacter Pylori eradication, peptic mucosal lesions treatment). (13) It is important to study the types of abnormal histopathologic changes and risk factors associated with potentially premalignant histopathologic change as Lymphoid aggregates, folliculargastritis, gastro intestinal Stromal tumor, mucosa associated lymphoid tissue lymphoma and intestinal metaplasia (14).

Patients and Methods:-

A total number of 25 morbidly obese patients were included in this study Between march 2014 and November 2017. Males and females were included in the study. All patients were treated by Endocrine Surgery Team in the Endocrine Surgery Unit (ESU), Mansoura University Hospitals. Inclusion criteria were: (1)Age between 12 – 55 years, (2)BMI more than 40 kg/m², (3) Patients were morbidly obese for more than 5 years with failure of medical treatment modalities, (4)Mentally stable, (5)Cooperative and motivated patient, (6)Presence of obesity related complications e.g. hypertension diabetes, osteoarthritis, and hyperlipidemia (if BMI between 35 – 40 kg /m²). The exclusion criteria were: (1)Lack of motivation, (2) Mental and psychological instability, (3)Drug or alcohol addicts, (4)Patients unfit for general anesthesia. All patients wrote informed consent for inclusion in the study after explanation of the nature of the operation and possible complications. The study was approved by Mansoura Faculty of Medicine ethical committee.

Preoperatively our patients were subjected to Complete history taking regarding age, sex, obesity associated comorbidities, Other methods used for weight reduction and their effectiveness and Family history of obesity. General and abdominal examination, body Weight , Height ,body mass index and preoperative investigations.

Operative Technique:

All patients were in supine position. Sterilization of the abdominal wall was done. Upper midline incision was done. Linea Alba was identified and incised. The abdominal cavity was entered and abdominal and pelvic exploration was done in every patient. Devascularization of greater curvature of the stomach was performed. The duodenum is sectioned at the level of the gastroduodenal artery, warranting a 2 to 4 cm proximal duodenal stump and avoiding damage to the common bile duct. The distal duodenal stump is over sutured. We start by duodenal transection before sleeve gastrectomy to facilitate sleeve gastrectomy as reported in Abdlatif Modification (12). A 36 French bougie is passed into the stomach along the lesser curve to the Pylorus. Then stapling was done. Then the entire staple line is then oversewn with a continuous suture. The ileocecal junction is identified, and 200 cm is measured upwards. The selected loop is ascended up to the proximal duodenal stump and anastomosed in an isoperistaltic way by hand-sewn anastomosis. The anastomosis was tested for leaks with methylene blue through the nasogastric tube. Tube drain was inserted near to gastrojejunal anastomosis. Then closure of the abdomen in layers. Gastric mucosal biopsy was taken from resected stomach and sent for pathology.

Follow up of all patients done six months after the operation for body weight, body mass index and associated co-morbidities (diabetes mellitus and hypertension). Upper gastrointestinal endoscopy was done in that visit and gastric mucosal biopsy was taken and sent for pathology.

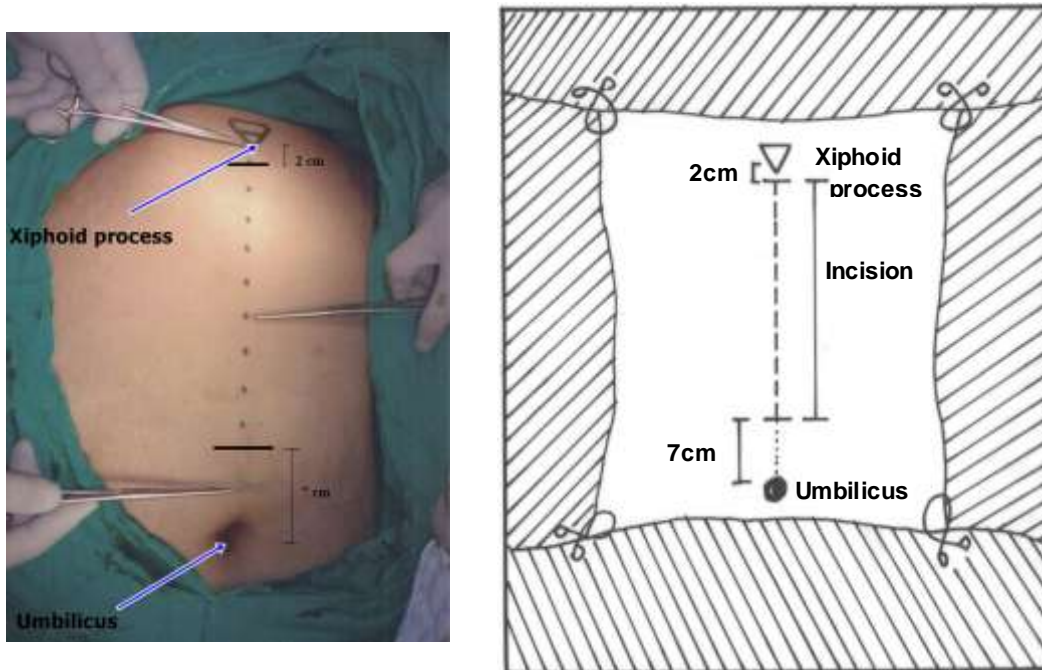


Figure 1:- Skin Incision (upper midline) started 2cm below the tip of xiphoid process and ended at a point 7cm above the umbilicus.

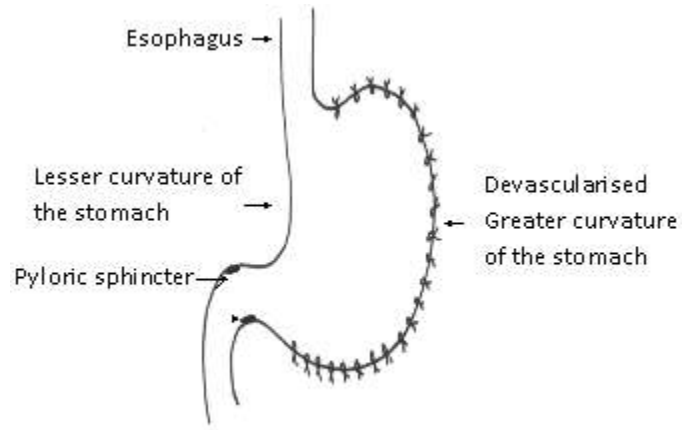
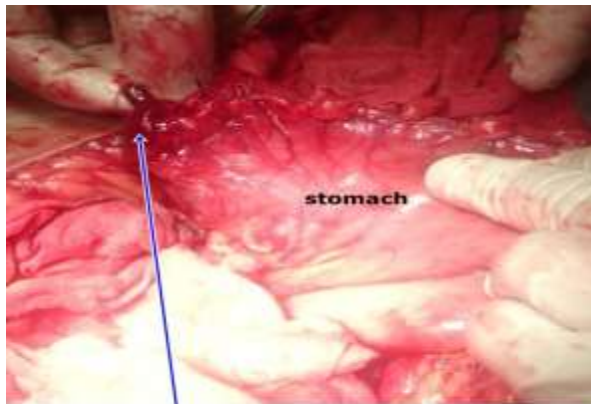


Figure 2:-Devascularization of the greater curvature of the stomach.



transected deudenum

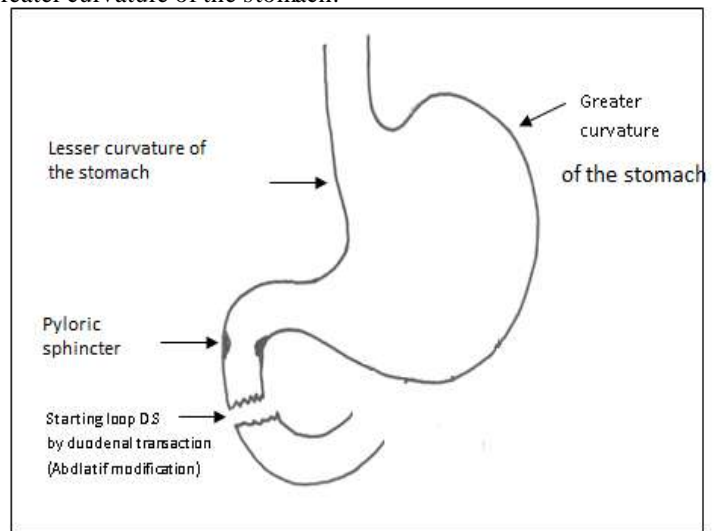
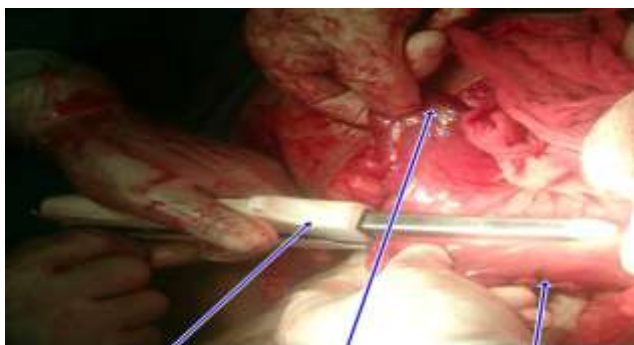


figure 3:-transection of the duodenum at the level of the gastroduodenal artery



stapler
deudenal stump
greater curvature of the stomach

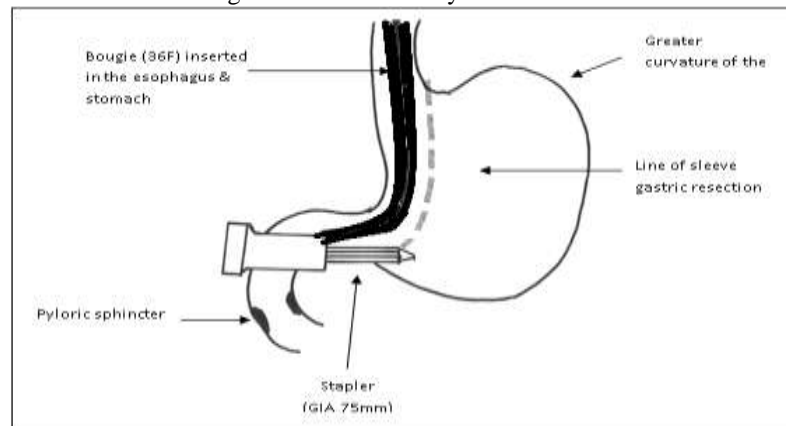


Figure 4:-Application of the linear cutter 75mm, 4-6cm from the pylorus.

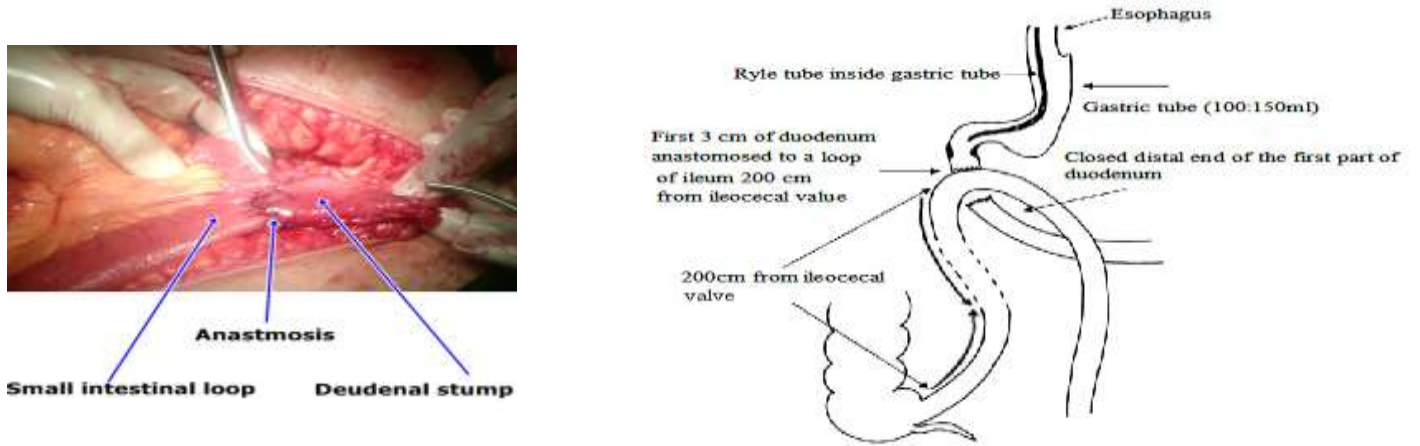


Figure 5:-Anastomosis done between proximal duodenal stump and a loop of the ileum 200 cm from ileocecal valve

Result:-

The study included 18 females (72 %) and 7 males (28%) and their mean age was 34.7 ±5.8 years The mean body of our patients was 156.8 ±14.9 kilo grams and the mean body mass index was 55.0 ±4.7 as shown in table 1

Table 1:-socio-demographic data

Age (years)	34.7 ±5.8
Sex (n, %)	
Females	18, 72.0%
Males	7, 28.0%
Body weight (kg)	156.8 ±14.9
BMI (kg/m ²)	55.0 ±4.7

The mean body weight of our patients six month post duodenal switch operation was 116.2 ±15.2 kilo grams in comparison with mean body weight pre-operative which is 156.8 ±14.9 kilo grams . with mean weight loss about 40.6 kilo grams in 6 month and the mean body mass index six month post duodenal switch operation is 40.7 ±4.4 in comparison with mean body mass index 55.0 ±4.7 pre-operative. with mean body mass index loss about 14.3as shown in table 2

Table 2:-Comparison of the body weight and BMI pre-operative and six month after duodenal switch operation

	pre-operative	6 month post-operative	Student's t test	
	Mean ±SD	Mean ±SD	T	P
Body weight (kg)	156.8 ±14.9	116.2 ±15.2	9.537	<0.001
BMI (kg/m ²)	55.0 ±4.7	40.7 ±4.4	11.106	<0.001

Histo-pathological examination of intra-operative gastric mucosal biopsy taken from resected stomach in duodenal switch operation were Seven cases: normal gastric mucosa (28%), Seven cases: Mild superficial gastritis (28%), Three cases: Mild chronic gastritis (12%), Six cases :Helicobacter pylori gastritis (24%) and Two cases: Severe chronic superficial gastritis (8%). While Histo-pathological examination of six month post-operative gastric mucosal biopsy taken by upper GI endoscopy in duodenal switch operation were: 12 cases normal gastric mucosa (48%), Six cases Mild superficial gastritis (24%), Four cases Mild chronic gastritis (16%), Two cases Helicobacter pylori gastritis (8%) and One cases Severe chronic superficial gastritis (4%) as shown in table 3.

Comparing the histo-pathological examination between pre-operative and six month after surgery in duodenal switch operation group shown in table 3: Normal gastric mucosa increased to 12 cases (48%) six month post-operative in comparison to seven cases (28%) at time of operation and Pathologic gastric mucosa decreased to 13 cases (52%) six month post-operative in comparison to 18 cases (72%) at time of operation

Table 3:-Comparison of histo-pathological examination between pre-operative and six month after surgery in duodenal switch operation

	Intra-operative		6 month after surgery		Chi square test	
	N	%	n	%	X ²	p
Normal gastric mucosa	7	28.0	12	48.0		
Mild superficial gastritis	7	28.0	6	24.0		
Mild chronic gastritis	3	12.0	4	16.0		
Helicobacter gastritis	6	24.0	2	8.0		
Severe chronic superficial gastritis	2	8.0	1	4.0	3.869	0.424
Metaplasia	0	0	0	0		

In the pre-operative assessment there was eight cases with type II Diabetes mellitus and become zero cases six month post-operatively with cure rate 100% and there was seven cases with hypertension pre-operatively and become one case 6 month post-operatively with cure rate 85.7% as shown in table 4.

Table 4:-Comparison of the co-morbidities between the pre-operative and six month after duodenal switch operation

	Baseline		After surgery		Chi square test	
	n	%	N	%	X ²	p
Diabetes mellitus						
No	17	68.0	25	100.0		
Yes	8	32.0	0	0.0	9.524	0.002
Hypertension						
No	18	72.0	24	96.0		
Yes	7	28.0	1	4.0	5.357	0.021

Discussion:-

The female gender comprised the majority of cases (72%), while female gender comprised 80% in Abd-Elatif A, et al. (12). The females may be susceptible for obesity or more to seek for medical and surgical advice because they are more interested with their shape.

Mean age of our patients was 34.7 ± 5.8 years compared to 42.4 ± 10.1 years in Nelson, Let al (15).

The mean body weight for our patients at the time of operation is 156.8 ± 14.9 kilo grams and the mean body mass index is 55.0 ± 4.7 . compared to mean body weight 151.14 kilo grams and mean body mass index 56.52 in Abd-Elatif A, et al. (12). And mean body mass index 58.4 ± 8.3 in Nelson, Let al (15).

The mean body weight 6 month after the operation is 116.2 ± 15.2 kilo grams. with mean weight loss about 40.6 kilo grams in 6 month. And the mean body mass index 6 month after the operation is 40.7 ± 4.4 compared to mean body weight 107.83 ± 13.72 kilo grams and body mass index 40.22 ± 5.51 in Abd-Elatif A, et al. (12) 6 month after the operation with nearly equal results with our study.

Duodenal switch operation in the previous literature by Sánchez-Pernaute A et al. (11) sleeve gastrectomy was done before duodenal switch transection. But in another study done before in our department (endocrine surgery unit in mansoura university hospital) duodenal transection was done then sleeve gastrectomy. (Abd-Elatif modification) (12). And in our study we did this modification as it is observed that starting with duodenal transection facilitates the sleeve gastric resection.

Our results consistently demonstrated the presence of a link between morbid obesity and sweet eating and which is defined by the Dutch Sweet Eating Questionnaire as an eating behavior in which at least 50% of daily consumed carbohydrates consist of simple carbohydrates and which can be triggered by emotional factors (i.e., stress), This was proved by Van den Heuvel et al. (16). So in our study we did duodenal switch operation to sweet eater patients and it is exclusion criteria for laparoscopic sleeve gastrectomy operation.

Gastric mucosal changes in group II (open duodenal switch operation) show that normal gastric mucosa increase to 12 cases (48%) 6 month post-operative in comparison to 7 cases (28%) at time of operation

Pathological gastric mucosa decrease to 13 cases (52%) 6 month post-operative in comparison to 18 cases (72%) at time of operation and those include the following:

1. Mild superficial gastritis decrease to 6 cases (24%) 6 month post-operative in comparison to 7 cases (28%) at time of operation
2. Mild chronic gastritis increase to 4 cases (16%) 6 month post-operative in comparison to 3 cases (12%) at time of operation
3. Helicobacter gastritis decrease to 2 cases (8%) 6 month post-operative in comparison to 6 cases (24%) at time of operation
4. Severe chronic superficial gastritis decrease to 1 case (4%) 6 month post-operative in comparison to 2 cases (8%) at time of operation.

And up to our knowledge there is no studies comparing the intra operative and post operative gastric mucosal changes in patients who underwent Duodenal switch operation (Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy) and this is the first study.

In pre-operative assessment of our patients there is eight (32%) cases had type II diabetes mellitus and seven cases (28%) had hypertension. And the six month post-operative assessment there was no cases have type II diabetes mellitus with cure rate 100% and one case (4%) still hypertensive with a significant reduction of doses of anti hypertensive medicine with cure rate 85.7%.

In a study done by Nelson, L et al (15) for 72 patients who underwent duodenal switch operation (Single anastomosis duodeno-ileal bypass with sleeve gastrectomy): A total of 18 patients (26.1%) presented with type two diabetes mellitus at the time of surgery. Of these, 9 patient (50.0%) resolved, and six (33.3%) improved by six months after the operation with cure rate 83.3% six month after the operation. and one remained And there were 33 patients (47.8%) with hypertension at the time of surgery, 14 (42.4%) had their HTN resolved at six months with cure rate 57.6%

In another study done by Onzi T.R (17) for 12 patients who underwent laparoscopic sleeve gastrectomy, the pre operative gastric mucosal biopsy were : four patients with helicobacter pylori gastritis (33.3%) , four patients with chronic gastritis (33.3%) and one patients with intestinal metaplasia (8.3%) . seven patient with Foveolar hyperplasia. While post operative endoscopic biopsy were: two patients with chronic gastritis(16.7%), one patient with intestinal metaplasia (8.3%) and four patients with Foveolar hyperplasia (33.3%).

Conclusion:-

open duodenal switch operation (Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy) for morbidly obese patients gives very good results in weight loss as there was statistically significant reduction of weight and body mass index 6 months after the operation.

Better results after surgery was noticed in our patients as regards control of diabetes mellitus type II and hypertension indicating an improvement in the quality of life of these patients..

As regards the epithelial changes after surgery it was noticed that , there was marked increase in the normal gastric mucosa and decrease in the presence of superficial gastritis and helicobacter pylori gastritis.

So our advice is :Open duodenal switch operation (Single Anastomosis Duodeno-Ileal Bypass with Sleeve Gastrectomy) is the best to be done in morbidly obese patients because of marked sustained reduction of body weight and control of diabetes mellitus(type two) and hypertension.

References:-

1. Adair JD and Pleatman MA. Definition of Obesity and Indications for Surgery. In "The SAGES Manual: A Practical Guide to Bariatric Surgery", Nguyen NT, DeMaria EJ, & Ikramuddin S, (Eds.); New York: Springer Science+Business Media, LLC, 2008 4: 27-30.
2. World Health Organization (2016). Obesity and overweight .[cited 2016 August 15]. Available from <http://www.who.int/mediacentre/factsheets/fs311/en>.
3. El Ansari W, El Ashker S and Moseley L. Associations between Physical Activity and Health Parameters in Adolescent Pupils in Egypt. *Int J Environ Res Public Health* 2010; 7: 1649-1669.
4. Li Z, Bowerman S, Heber D (2005) Health ramifications of the obesity epidemic. *Surg Clin North Am* 85: 681-70, v.
5. Kitahara CM, Flint AJ, BerringtondeGonzalez A, et al Association between class III obesity (BMI of 40-59 kg/m²) and mortality: a pooled analysis of 20 prospective studies. *PLoS Med* 2014 Jul 8; 11(7): e1001673. doi:10.1371/journal.pmed.1001673
6. Schirmer B, Schauer PR. The surgical management of obesity. In: Brunicaudi, Andersen D, Hunter J, et al., editors. *Schwartz's principles of surgery ninth edition*. USA: McGraw-Hill Companies p.952-3 2010
7. van Rutte PW, Smulders JF, de Zoete JP, et al. Outcome of sleeve gastrectomy as a primary bariatric procedure. *Br J Surg* <https://doi.org/10.1002/bjs.9447>. 8-661:(6)101 2014
8. Korenkov M (2006) Bariatric surgery. *Contrib Nephrol* 151: 243-253
9. Ren CJ, Patterson E, Gagner M. Early results of laparoscopic biliopancreatic diversion with duodenal switch: a case series of 40 consecutive patients. *Obes Surg* 2000;10:514-23; discussion 524.
10. Himpens J, Dobbeleir J, Peeters G. Long-term results of laparoscopic sleeve gastrectomy for obesity. *Ann Surg*. 2010;252(2):319-24.
11. Sánchez-Pernaute A, Rubio Herrera MA, Pérez-Aguirre E, et al. Proximal duodenal-ileal end to- side bypass with sleeve gastrectomy: proposed technique. *Obes Surg*. 2007;17:1614-8.
12. Abd-Elatif A, Youssef T, Farid M, Ali Y, Gado W (2015) Nutritional Markers after Loop Duodenal Switch (SADI-S) for Morbid Obesity: A Technique with Favorable Nutritional Outcome. *J Obes Weight Loss Ther* 5: 268. doi:10.4172/2165-7904.1000268
13. Canil, A.M., Iossa, A., Termine, P. et al. *OBES SURG* (2018) 28: 1760. <https://doi.org/10.1007/s11695-017-3092-9>
14. Safaan, T., Bashah, M., El Ansari, W. et al. *OBES SURG* (2017) 27: 1741. <https://doi.org/10.1007/s11695-016-2525-1>
15. Nelson L et al. Safety and effectiveness of single anastomosis duodenal switch procedure: preliminary results from a single institution. *Arq Bras Cir Dig*. 2016;29(Suppl1):80-4.
16. van den Heuvel M, Hörchner R, Wijtsma A, Bourhim N, Willemsen D, et al. (2011) Sweet eating: a definition and the development of the Dutch Sweet Eating Questionnaire. *Obes Surg* 21: 714-721.
17. Onzi TR, Acampora A, Araújo FM, Baratieri R, Kremer G, Lyra Jr HF and Leitão JT. Gastric Histopathology in Laparoscopic Sleeve Gastrectomy: Pre- and Post-Operative Comparison *OBES SURG* (2014)24:371-376 DOI 10.1007/s11695-013-1107-8