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DRG, Costs and Reimbursement following Roux-en-Y Gastric Bypass: an Economic Appraisal

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Background: There is disagreement regarding hospital and physician reimbursement fees when DRG codes are used. We have found that physicians and hospitals are rewarded differently depending on the type of insurance coverage – per diem HMO (Health Maintenance Organization) vs public.

Methods: 133 patients were retrospectively analyzed in a single institution. There were 59 privately-insured and 74 publicly-insured patients. Using DRG 288, hospital and surgeon reimbursement rates, complications, length of stay, blood loss and basic demographics were evaluated on all patients. Reimbursement rates were then compared to inpatient hospital costs per case for both open and laparoscopic Roux-en-Y gastric bypass (RYGBP). Statistical analysis used Student's t-test and standard deviation.

Results: The 2 groups were similar in terms of age, sex and BMI. There was a large difference in physician reimbursement when comparing public to private insurance ($931±73 vs $2356±822, $P<0.001$). Likewise, there was a large difference in hospital reimbursement (public $11773 ± 4462 vs private $4435 ± 3106, $P<0.001$). The estimated costs for open gastric bypass was $3179 vs $4180 for the laparoscopic bypass. The HMO per diem rate was $1000 per day.

Conclusion: There is a relative disincentive for surgeons to treat publicly-insured patients, while there is an incentive for hospitals to treat those patients. The converse is true for the privately-insured patients. This dichotomy will impede the development of new centers and place greater burden on bariatric surgeons to reduce cost by performing the open RYGBP.

Key words: Morbid obesity, cost, reimbursement, gastric bypass, bariatric surgery

Introduction

Obesity continues to be a global epidemic, with over 45 million Americans affected by this disease condition.[1] Indeed, over 12 million Americans are morbidly obese, and these numbers are increasing at an alarming rate.[2] Obesity is a leading cause of illness and death worldwide. Over the past several years, however, bariatric surgery has reached the point where it is now the only proven therapy by which those characterized as morbidly obese can achieve and maintain significant long-term weight loss. In fact, with the NIH consensus conferences and Federal Guidelines for the treatment of obesity, the acceptance of surgical treatment of morbid obesity is now a reality.[3,4] Laparoscopic Roux-en-Y gastric bypass (LRYGBP), although technically challenging, is rapidly becoming a safe alternative to open Roux-en-Y gastric bypass (RYGBP). As a result, we have seen a significant increase in the number of surgeons performing the RYGBP along with the development of many new centers for the surgical treatment of obesity. In our immediate vicinity, we have noted the development of five new centers for the surgical treatment of obesity within a 4-year period.

There has been controversy, however, between hospital administrators and surgeons as to the eco-

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nomic viability of surgery for morbid obesity, particularly with regards to hospital reimbursement when the laparoscopic approach is used. Indeed, surgeons are finding themselves under increasing pressure from hospital administrators to perform the open procedure in contrast to the laparoscopic method, both of which have been shown to be equally effective.[5,6]

The primary aim of this study is to retrospectively evaluate our DRGs (Diagnostic-Related Groups), costs and reimbursements for the initial hospital length of stay (LOS) of all morbidly obese patients undergoing the open and laparoscopic RYGBP and compare the economic impact on surgeons and institutions.

Patients and Methods

From the period January 2001 to December 2001, 144 patients underwent RYGBP at the Nassau University Medical Center, a 500-bed tertiary-care center with a fully accredited residency program in general surgery. A total of 133 charts were retrospectively analyzed, and 11 were excluded due to inadequate or incomplete data. Of the charts retrospectively reviewed, 122 underwent an open RYGBP and 11 had a LRYGBP. There was one conversion from the laparoscopic to the open group because of an enlarged liver. The converted patient was kept in the laparoscopic group, based on intent to treat.

All open procedures were performed by a single surgeon (LDGA) and similarly for the laparoscopic group (PJG). All patients received one dose of preoperative antibiotics and two doses postoperatively. They all received prophylaxis for deep vein thrombosis with Lovenox (Aventis) 40 mg daily, a sequential compression device (Kendall), and ambulation every 2 hours.

In the open technique, all patients had a 15 to 20 cc gastric pouch created with a single TA90B stapler (US Surgical Corp) and a side-to-side jejuno-jejunostomy created with a GIA 60 (US Surgical Corp). Our laparoscopic technique also created a 15-20 cc pouch but used seven non-reusable trocars, multiple endoGIA II staplers to divide the stomach and create the jejuno-jejunostomy, and a single EEA stapler (US Surgical Corp) for the end-to-side gastrojejunostomy. Of note, the anvil was placed transorally to perform the gastrojejunostomy, similar to the technique described by Wittgrove et al.[7]

All our patients were extubated and transferred to the floor with a rare patient going to the ICU. All patients had a nasogastric tube for the first 24 hours, a PCA pump, a one to one patient care assistant to aid in ambulation, a Gastrografin® study on postoperative day 2, and were discharged when tolerating oral intake with GI function. In addition to the basic demographic data, our study protocol also analyzed 30-day complication rate, BMI, DRG used, operative time, cost, estimated blood loss (EBL), ICU stay, blood transfusions, hospital stay, co-morbidities and reimbursements following each procedure. Our costs were calculated in US dollars and included direct, indirect and total costs . Direct costs consisted of operative and hospital services and consisted of operating-room time, operating-room supplies and post-anesthesia care. Costs, in US dollars, are reported as mean ± standard deviation. Hospital service costs were broken down as nursing, pharmaceutical, diagnostic and/or therapeutic radiologic studies. Calculated indirect costs were housekeeping, overhead costs, insurance and employee benefits. Our reusable laparoscopic equipment was not included into the cost of the operation. Demographic data, operative/ perioperative data as well as costs and reimbursements were compared between the laparoscopic and open group. Reimbursement was analyzed from the point of view of the physician as well as the institution and was further broken down into two payer groups – namely private and publicly insured patients.

All continuous data are expressed as mean ± standard deviation. The differences between our laparoscopic and open groups were analyzed using Student's t-test or Fisher's exact tests for categorical data.

Results

Between January and December 2001, 144 patients underwent RYGBP at NUMC; 133 charts were retrospectively analyzed, with 122 undergoing open RYGBP and 11 procedures being performed laparo-

scopically (LRYGBP). Although the preoperative weights and ages of the two groups were similar, the preoperative BMI was lower in the laparoscopic group (49.54 ± 6.51 vs 55.32 ± 5.64) ($P< 0.005$). As expected, both groups showed a higher prevalence of females compared to males undergoing RYGBP (Table 1). As depicted in Table 2, co-morbidities were similar between the groups, with pulmonary disturbances (exertional dyspnea and asthma), osteoarthritis, hypertension, hypercholesterolemia and depression representing significant co-morbidities in both groups. A significant difference was noted in operative time and LOS between the laparoscopic and open group, with the laparoscopic group taking twice as long as the open RYGBP to perform (285 ± 50 min vs 155 ± 48 min) ($P<0.001$) and having a shorter hospital LOS (LRYGBP 3.5 ± .69 days vs RYGBP 4.8 ± 1.2 days) ($P< 0.001$).

The open RYGBP group had significantly more blood loss compared with the laparoscopic group, with two patients (1.6%) requiring blood transfusions and three others requiring ICU stays (Table 3).

Table 1. Demographics of open and laparoscopic cases

Characteristics	LRYGBP (n=11)	Open RYGBP (n=122)	*P*-value
Gender			
Male	0	13	-
Female	11	109	-
Age (yrs)	37.42 ± 12	40.26 ± 14	0.516
Preop Weight	292 ± 29.73	305 ± 26.21	0.122
Preop BMI	49.54 ± 6.51	55.32 ± 5.64	< 0.05

Table 2. Co-morbidities in these bariatric cases

Co-morbidities*	LRYGBP (n-11)	Open RYGBP (n=122)
Hypertension	3 (25)	35 (29)
Diabetes	1 (8)	21 (17)
Reflux disease	4 (33)	24 (20)
Resp. complications	8 (67)	89 (74)
Sleep apnea	1 (8)	10 (8)
Osteoarthritis	6 (50)	60 (49)
Hypercholesterolemia	5 (42)	31 (26)
Depression	8 (67)	18 (15)
Urinary incontinence	4 (33)	19 (16)

*Numbers in parentheses represent percentages.

The 30-day complication rates are depicted in Table 4. The open group had 16 complications (rate 13%), in contrast to the laparoscopic group which had five complications (rate 45%), suggesting a higher 30-day complication rate in the LRYGBP. An interesting complication of lower extremity compartment syndrome was noted in the laparoscopic group and was reported in the literature.[8]

When we looked at costs, we noted a significantly lower direct cost in the open group by at least $1000 ($3179 ± 101 vs $4180 ± 382) ($P< 0.001$). The indirect costs were significantly lower in the laparoscopic group ($1792 ± 263) in contrast to the open group ($2137 ± 285) ($P<0.001$); however, as we see in Table 5, total cost was found to be higher in the open group ($7894 ± 264) when compared to the laparoscopic group ($6350 ± 75) ($P< 0.001$).

Of 133 patients undergoing the RYGBP, there

Table 3. Operative/perioperative data following the open and laparoscopic approaches

Parameter	LRYGBP (n=11)	Open RYGBP (n=122)	*P*-value
Operative time (min)	285 ± 50	155 ± 48	< 0.001
EBL* (ml)	125 ± 68	305 ± 83	< 0.001
ICU stay	0	3	-
Hospital LOS (days)	3.5 ± .69	4.8± 1.2	< 0.001
Transfusions	0	2	-

*estimated blood loss. Values are mean ± SD.

Table 4. Operative/perioperative complications following the open and laparoscopic approaches

Complication	LRYGBP (n=11)	Open RYGBP (n=122)
Compartment syndrome	1	0
Obstruction	1	2
Wound seroma	1	8
Wound infection	1	2
Pulmonary embolism	0	1
DVT*	1	1
Stomal stenosis	0	2
Total	5	16

*DVT= deep vein thrombosis

Table 5. Cost of gastric bypass using the laparoscopic and open approach*

	LRYGBP (n=11)	Open RYGBP	*P*-value (n=122)
Direct Cost*	4180 ± 382	3179 ± 101	< 0.001
Indirect Cost*	1792 ± 263	2137 ± 285	< 0.001
Total Cost	6350 ± 75	7894 ± 264	< 0.001

*Cost= U.S. Dollars – Mean ± SD

were 59 privately-insured and 74 publicly-insured (Medicaid and Medicare) patients. Analysis of the reimbursement data revealed that physicians are reimbursed by private payers an average of $2356 ± 822 and hospitals an average of $4435 ± 316 based on a reimbursement rate of $1000 per day (Table 6). The cost to reimbursement ratio for the institution was 1:1.4 for private patients and 1:4 for publicly-insured patients. In contrast, public insurance reimbursement for surgeons averaged $931 ± 110. A significant difference was noted in reimbursement to surgeons between those privately- and publicly-insured ($P< 0.001$) (Table 6). Amazingly, using DRG 288, the reimbursement to the hospital for those publicly insured who underwent the RYGBP open or laparoscopic was $11,773 ± 4462.

Discussion

Our retrospective analysis confirmed a number of facts already present in the literature and discovered some startling economic reimbursement issues. This study confirmed the previous finding of reduced LOS associated with the laparoscopic approach to bariatric surgery. However, this was detrimental to our institution, because the direct costs associated with the LRYGBP were higher than the open RYGBP (Table 5) and the reimbursement on a per diem basis was lower (based on 2.3 days stay for the laparoscopic group versus 4.5 days for the open group).The direct cost was higher in our laparoscopic group by at least $1,000 and was primarily due to the use of expensive, disposable equipment. This contrasted with the higher total cost in the open group. The increased cost in the open group was due to an increased LOS and this cost is almost entirely a "fixed cost", namely a necessary expenditure for the daily functioning of the institution and not necessarily due to the increased LOS of the open gastric bypass. Most revealing in our study was the reimbursement rates between privately- and publicly-insured patients. Public insurance (Medicaid and Medicare) rewards physicians poorly for their efforts (Table 6). Our mean physician reimbursement rate was $931 for those publicly-insured (the vast majority were Medicaid recipients although Medicare reimbursement is slightly better at $1,700 per case) in contrast to $2,356 for those privately-insured. This type of reimbursement discourages care for those who need it the most – namely the poor – since a significant percentage are morbidly obese.[9,10] The hospital reimbursement, however, is striking for those publicly insured at an average of $11,773 per case. This is in sharp contrast to an average hospital reimbursement rate of $4,435 per case for those privately insured.

This current method of hospital reimbursement by private payers barely meets the direct cost incurred using the technological advances made in laparoscopy in the performance of the RYGBP. The discrepancy can potentially result in undue pressure on surgeons to perform the open in contrast to the laparoscopic RYGBP, because an increased LOS would result in an increase in hospital reimbursement. The reimbursement scheme for those publicly-insured, on the other hand, places hospitals and physicians at odds with each other and discourages surgeons from caring for those who are limited in their ability to obtain gainful employment and insurance. This inequity in physician reimbursement further forces the poor to remain entangled in a vicious cycle of obesity and its dependency on public assistance.

Table 6. Surgeon and hospital reimbursement for the Roux-en-Y gastric bypass – DRG 288

Payor	Surgeon	Hospital	*P*-value
Private (n=59)	2,356 ± 822	4,435 ± 316*	< 0.05
Public (n=74)	931 ± 73	11,773 ± 4,462	< 0.001
P-value	< 0.001	< 0.001	

*Reimbursement @ $1,000/day

Sadly, many of our surrounding bariatric facilities do not accept public insurance on the basis of poor physician reimbursement. In their own words, "the risks (malpractice insurance, staff, increased time) outweigh the benefits" for the physician.

Our study is clearly not without limitations. It is retrospective in nature and has a limited number of laparoscopic cases. Additionally, the calculation of direct and indirect costs as well as reimbursement can vary dramatically from institution to institution. As full-time academicians, we also realize that our survival is closely intertwined with the survival of the institutions where we work, and as such we have modified our surgical approach and perform only the open RYGBP. We also strive to maintain a healthy mix of public- and privately-insured patients for the solvency of the institution and our program. We clearly do not advocate that all centers do as we have done, because there are great regional variations in costs and reimbursements throughout the country.

Summary

Although we believe that there is a role for the LRYGBP, we strongly suggest that every bariatric center do a cost and reimbursement analysis and decide which approach, laparoscopic or open, is best for them. Regardless of which approach is used, it is clear that each bariatric center must achieve the proper patient mix, between public and private insurance, that provides for both the financial health of the physician as well as the institution. The reduced LOS from the LRYGBP can potentially result in a net loss for our hospitals – particularly with the new technological advances. Hence, situational awareness is crucial on the part of all bariatric surgeons if we are to continue to help our morbidly obese patients and survive in the current health-care market.

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