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Meralgia Paresthetica After Bariatric Surgery in Iranian Patients

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ABSTRACT

Background: Meralgia paresthetica (MP) is a benign clinical syndrome of entrapment of the lateral cutaneous nerve in the thigh. Among the complications of bariatric surgery, neurologic complications are not uncommon and of these complications, MP is a frequent clinical diagnosis. Thus, knowing the clinical risk factors of MP is of great importance as they help with the differential diagnoses of MP from other serious disorders.
Objectives: To study the prevalence of MP and its clinical risk factors after bariatric surgery in a sample of Iranian morbid obese patients undergoing surgery for obesity.
Patients and Methods: In a cross-sectional study, 163 patients (146 females and 17 males), who underwent bariatric surgery, were called one to 48 months after their surgery. After obtaining their consent, the patients were interviewed and completed a questionnaire containing history and presentation of neuropathy for this study. In addition, some of the variables of the questionnaire were filled using the patient's medical records.
Results: One month after surgery, 32 patients (19.5%) had neurologic signs or symptoms of MP located in their lateral thigh. Diagnosis of MP was made in 21 (17 women and four men) patients (12.8% of all patients), sub-acute polyneuropathy in seven patients (4.3%), and acute polyneuropathy in the remaining four patients (2.4%). No specific treatment was given to the patients with MP. Symptoms of MP were resolved within six months in 15 patients (71.4%). In a univariate analysis of MP, only a history of a neuropathy was significantly correlated with the occurrance of MP after surgery ($P = 0.004$) with an odds ratio of 4.2 (95% confidence interval: 1.4-12.2).
Conclusions: MP is not a common complication after bariatric laparoscopic surgery, however, a history of neuropathy and diabetes should be mentioned to surgeons as risk factors for MP. Additionally, using a belt for fixation could be a an etiologic factor for MP after bariatric surgery.

▸ *Implication for health policy/practice/research/medical education:*
This article will be helpful for surgeons by encouraging them to pay more attention to the position of patients undergoing laparoscopic bariatric surgery, due to a complication called meralgia parasthetica.

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1. Background

The lateral cutaneous nerve of the thigh is a pure sensory nerve of the lumbosacral plexus that innervates the anterolateral part of the thigh. Compression of the nerve, most commonly as it passes under the inguinal ligament, results in meralgia paresthetica (MP) as a clinical syndrome of; pain, burning, paresthesia (numbness and tingling), in the distribution of the nerve (1-3). Following surgery for obesity or bariatric surgery, a variety of neurologic complications may affect the nervous system such as; encephalopathy, optic neuropathy, myelopathy, polyradiculoneuropathy, and polyneuropathy. Myelopathy is the most common problem with a major morbidity (4).

MP occurs when the lateral femoral cutaneous nerve, a nerve that supplies sensation to the surface of your outer thigh, becomes compressed, or 'pinched'. Different causes of this compression include any condition that increases pressure on the groin, including; tight clothing, obesity, pregnancy, scar tissue near the inguinal ligament, due to injury or past surgery, walking, cycling or standing for long periods of time, and nerve injury, which can be due to diabetes or seat belt injury after a motor vehicle accident. The position of the patient during surgery (V position), use of a belt to attach the patient to the table during surgery, prolonged surgery, and using a deferent retractor during open abdominal surgery, can also cause MP. Among the complications of bariatric surgery, neurologic complications are not uncommon. These neurologic complications include compression mononeuropathies due to weight loss or neurologic dysfunctions due to malabsorption. A collection of 50 case studies relating to neurologic complications from bariatric surgery found that a total of 96 patients, including peripheral neuropathy in 60 (62%), and encephalopathy in 30 (31%) patients, were affected. Forty out of the 60 peripheral neuropathies were of a polyneuropathic nature and 18 were mononeuropathies. Most mononeuropathies (17 out of 18) were MP.

The syndrome of lateral cutaneous nerve entrapment in the thigh found in MP has been repeatedly reported as a neurologic complication of bariatric surgery (2, 5, 6). MP has a benign course, it is usually self-limited and responds to conservative management (3, 7). However, serious problems such as; nerve root compression due to a herniated disc, lumbar radiculopathy, spinal stenosis, femoral neuropathy, thrombophlebitis, osteoarthritis, and deep vein thrombosis are included in a differential diagnosis of meralgia paresthetica (2, 6, 8, 9). Although electromyography, nerve conduction studies, and simple x-rays can be used to rule out a differential diagnosis in uncertain cases (8, 10), the unique description of pain and characteristic location, sensory abnormalities on examination, normal neurologic examination of the lower leg, and the presence of clinical risk factors, could help in the diagnosis of MP (6, 8). Thus, diagnosis of MP after bariatric surgery is of great importance because it rules out other more serious diagnoses. In addition, the symptoms are usually of great concern to the patient, who often considers them as a serious problem related to complications from the surgical process. They need repeated reassurance about the benign nature of the syndrome (2, 7). Thus, knowing the risk factors of MP is of great importance as they help to make a correct diagnosis. It has been shown that the rate of MP is related to obesity, so that it is twice as common in obese people compared to non-obese people. Some believe that obesity causes MP by pannicular traction at the inguinal ligament and by increased intra-abdominal pressure (3, 11). In addition, advanced age and diabetes are often associated with MP (3). Additional associations include; tight belts or garments around the waist (12-14), scar tissue near the lateral aspect of the inguinal ligament and pregnancy (15-17).

2. Objectives

Although MP has been shown to be a complication of bariatric surgery, none of the previous studies have evaluated the risk factors of MP in patients undergoing laparoscopic bariatric surgery. Knowing the specific risk factors of MP in bariatric surgery may help surgeons to diagnose it more easily after surgery and reassure the patient that it is not a serious problem. Moreover, knowing the risk factors could help the design of strategies for the prevention and optimal management of MP after bariatric surgery. Thus, we studied the prevalence of MP in a sample of Iranian patients undergoing bariatric surgery and tried to discover the associated clinical risk factors.

3. Patients and Methods

In a cross-sectional study, morbidly obese patients who underwent bariatric surgery were studied. Based on international guidelines, patients become eligible for surgery if they have extreme obesity (BMI more than 40), or a BMI of more than 35, with the addition of certain defined co-morbidities. In this study, adults who underwent bariatric surgery from January 2009 to July 2011 in six hospitals of Tehran, Iran, were evaluated. During the operation, the patient was fixed by a belt onto the operation room bed in a reverse Trendelenburg position.

Following surgery, patients were called, and after obtaining consent, the patients were interviewed to complete the questionnaire of this study. The questionnaire contained questions about; baseline characteristics, medical history, type of bariatric surgery, and neurologic symptoms at the location of the lateral thigh after their surgery. Patients who had neurologic symptoms after bariatric surgery were asked about the medical management of this condition. In addition, some of the variables of the questionnaire were filled using the patient's medi-

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cal records.

Univariate analysis of MP was done using a chi-square or Fisher's exact test for qualitative variables and a t-test or Mann-Whitney U-test for quantitative variables. A Mann-Whitney U-test was used only for variables in which the distribution was significantly different from the normal distribution. All analyses were done by SPSS software version 13 Inc in Chicago, IL.

4. Results

Out of the 261 cases, 163 patients (146 females and 18 males) who had undergone laparoscopic bariatric surgery participated in our study. All surgeries were performed by two surgeons in six hospitals of Tehran (nearly 50% in the Rasoul-e-Akram Hospital), and they were interviewed one to 48 months after the surgery (with a mean of 10.76 months). Patients aged from 16 to 59 years at surgery with a mean age (± standard deviation) of 36.62 (± 9.31) years. There were 94 patients (57.3%) with a diverse history, including; hypertension, diabetes, cardiovascular problems, degenerative joint disease (DJD), lumbar disk herniation, local trauma, musculoskeletal problems or neuropathy. From this group, 22 patients (13.4% of all patients) had a history of neuropathy. A total of 131 patients (79%) had a gastric bypass performed, while for the other 33 patients (20.1%) a sleeve gastrectomy was conducted. Before surgery, mean (± standard deviation) BMI was 45.48 (± 6.73). One month after surgery, BMI (mean ± standard deviation) which was assessed in only 128 patients, had decreased to 40.37 (± 6.91). Within a range of 0 to 12 months after surgery, supplementation with multivitamins (57.9% of patients) or Pharmaton (42.1% of patients) was started. Following surgery, 32 patients (19.5%) had neurologic symptoms in the anterolateral thigh. These symptoms included; pain in 12% of patients (7.3%), burning in 11 (6.7%), numbness in 22 (13.4%), and hypersensitivity in eight patients (4.9%). The symptoms were unilateral in 18 patients and bilateral in the remaining 14 patients. In most cases (25 out of 32), patients were referred to the surgeon, not to other specialists. A diagnosis of MP was made in 21 patients (12.8%), sub-acute polyneuropathy in seven (4.3%) and acute polyneuropathy in the remaining four patients (2.4%). Among the patients with MP, electromyography was performed for eight patients (38% of all patients with MP) and one patient (4.8%) was readmitted. No specific treatments were done for the majority of patients. Symptoms of MP were resolved within two months in 10 patients (47.6%) and within six months in 15 patients (71.4%).

To evaluate the clinical risk factors of MP a univariate analyses of MP was done. As the distribution of all the quantitative variables were not different from the normal distribution in a Kolmogorov-Smirnov test, univariate analyses of MP was done using a t-test for all of the quantitative variables. As shown in *Table*, only a history of neuropathy was significantly correlated with the occurrence of MP after surgery ($P = 0.004$). MP occurred in 9.9% of patients without any previous neuropathy, while MP was present in 31.8% of patients with a history of neu-

Table. Univariate Analysis of MP Using Baseline Characteristics, Weight, BMI, and Associated Co-morbidities

	MP Negative (n =142)			MP Positive (n = 21)			*P* value
	Mean ± SD	No. (%)	Assessed Patients	Mean ± SD	No. (%)	Assessed Patients	
Female	-	129 (90.20)	142	-	17 (80.95)	21	0.254
Age, y	36.22 ± 9.56	-	142	39.33 ± 7.05	-	21	0.153
Weight before surgery, Kg	121.19 ± 21.28	-	142	125.33 ± 20.62	-	21	0.405
BMI before surgery, Kg/m²	45.46 ± 6.91	-	142	45.63 ± 5.52	-	21	0.914
Weight one month after surgery, Kg	108.19 ± 18.33	-	115	111.55 ± 14.29	-	18	0.459
BMI one month after surgery, Kg/m²	40.27 ± 7.11	-	110	41.13 ± 5.65	-	18	0.625
Laparoscopic sleeve gastrectomy	-	25 (18.19)	142	-	7 (33.33)	21	0.142
Duration of operation, min	150.21 ± 53.31	-	23	130.62 ± 42.96	-	8	0.357
Hypertension	-	20 (13.91)	142	-	3 (14.29)	21	1
Diabetes	-	20 (13.91)	142	-	1 (4.77)	21	0.481
Cardiovascular	-	6 (4.19)	142	-	1 (4.77)	21	1
Degenerative joint disease	-	23 (16.08)	142	-	4 (19.04)	21	0.754
Disk herniation	-	14 (9.79)	142	-	1 (4.77)	21	0.695
Local trauma	-	25 (17.48)	142	-	6 (28.57)	21	0.238
Neuropathy	-	15 (10.48)	142	-	7 (33.33)	21	0.010
Musculoskeletal	-	14 (9.79)	142	-	3 (14.28)	21	0.460

Abbreviations: BMI, body mass index; MP, meralgia paresthetica

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ropathy. In other words, a history of neuropathy had an odds ratio of 4.2 (95% confidence interval: 1.4 - 12.2) for the occurrence of MP after bariatric surgery.

5. Discussion

In a retrospective review of 500 patients who underwent bariatric surgery, neurologic complications were found in 23 patients, including; 12 patients with symmetric polyneuropathy, three patients with MP, two patients with burning feet syndrome, two patients with Wernicke-Korsakoff encephalopathy, two patients with posterolateral myelopathy, one patient with acute severe polyneuropathy, and one patient with myotonic syndrome (18). In fact, the occurrence of MP in bariatric surgery has been introduced in multiple papers, including one of the first case reports of three patients with MP following a gastroplasty, which was published in 1987 (19) and also, a retrospective study by Macgregor *et al.* that found 11 patients (six men and five women) with MP after bariatric surgery (2). Based on previous studies, the results of retrospective assessments of the prevalence of neurologic complications in bariatric surgery are not like each other. In a review article that evaluated 18 surgical series that were reported up to 2004, the prevalence of neurologic complications varied from 0.08% to 16% (20). This wide range of results could be due to the subjective nature of most neurologic complications of bariatric surgeries. For example, a diagnosis of MP is based on the patients' subjective symptoms and the level of patients' awareness about these symptoms can significantly affect the prevalence.

In retrospective studies, some patients may have forgotten their neurologic complications following surgery and some may overexpress them. Thus, we can expect a wide range of prevalence for a complication such as MP in retrospective studies of bariatric surgery. The prevalence of MP following bariatric surgery was 0.5% to 1.4% in three previous studies (2, 5) while it was 12.8% in our study. This difference may be the result of the subjective nature of MP and the retrospective design of these studies (2). It has also been mentioned that MP is associated with male gender. This result was similar in our study, as nearly 20% of patients with MP and 10% of patients without MP were men. However, the difference was not in the significant range. Also in a study of 11 patients, the occurrence of MP was associated with a higher BMI (2). However, there was no significant difference in this regard between the two groups in our study. Thus, it seems that prospective studies are needed in the future to accurately evaluate the role of BMI in the occurrence of MP after bariatric surgery.

In our study, most patients (133 ones) underwent a gastric bypass procedure. Gastric bypass is the most common bariatric surgery in which a small gastric pouch limits oral intake and the small bowel reconfiguration causes a mild malabsorption. Both mechanisms cause a significant weight loss (21). All of the other patients in our study (33 ones) underwent sleeve gastrectomy in which a partial gastrectomy is done. Sleeve gastrectomy was done on 33% of patients with MP while this percentage was 18 for those who did not have MP. However, the difference was not significant, this may be due to the small sample size of our study, and thus such a comparison cannot be made accurately. Therefore, the relationship between different bariatric surgical procedures and MP in studies needs to be assessed with larger sample sizes.

Among comorbidities, it is widely accepted that diabetes is associated with MP (2). In a retrospective study it was shown that the incidence of MP is seven times as high as that of the normal population (3). However, in our study there was no significant relationship between diabetes and MP. This can be attributed to the high prevalence of diabetes in obese patients undergoing bariatric surgery. In other words, in patients that undergo bariatric surgeries, the incidence of diabetes is very high in both MP positive and MP negative groups, while the incidence of diabetes is only high in MP positive groups in population based studies. In our study, a history of a neuropathy was significantly correlated with the occurrence of MP after surgery, with an odds ratio of 4.2 (95% confidence interval: 1.4-12.2). It shows that MP following bariatric surgery is four times more frequent in patients with a history of neuropathy. This can be explained by a greater susceptibility of these patients for the neuropathy of MP. In fact, a susceptible patient with a previous history of neuropathy can experience MP if he/she is obese and undergoes bariatric surgery. Another reason for such a finding can be the subjective nature of MP. Patients who have had a previous history of neuropathy are more aware and are more concerned about neurologic symptoms, compared to patients without such a history. Thus, they feel and report them more frequently than other patients.

As there are different ways for the fixation of patients on operation tables for bariatric surgery including; foot holder, specific tables and belt, we think using a belt for fixation (as we do) is a main etiology for MP after bariatric surgery. Panniculus adiposus weight on the inguinal ligament, which is more prominent during the reverse Trendelenburg position, in addition to patients having an underlying disease such as diabetes, plays a major role in MP. Nonetheless, MP is considered as a benign self-limited disease that does not persist for a long time (3, 7). In a case report on three patients with MP after gastroplasty, all symptoms were resolved within three months (6). In another retrospective study that found 11 cases of MP following bariatric surgery, symptoms resolved within three months in six of them (more than half of the patients) and only one patient had symptoms for more than one year (2). Among 17 cases of MP that were introduced in a collection of case reports on neurologic complications of bariatric surgery, only in four cases (23.5%) did symptoms

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persist for a long time (20). Similarly, in our study, symptoms of MP were generally not persistent. The symptoms were resolved within two months in 10 patients (47.6%) and within six months in 15 patients (71.4%). Considering the benign course of the disease, it rarely needs special treatment. It has been shown that 90% of patients respond to conservative measures alone (2, 7, 9, 10). In the same way, all of our patients received only conservative management. Because the effect of the patient's position and fixation on neuropathy is not clearly defined, we suggest that future studies are designed to compare different positions and fixations during operation with a randomized controlled trial method.

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Authors' Contribution

First author and corresponding author contributed 80% and the other authors 30%.

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