Postoperative Bilateral Meralgia Paresthetica after Spine Surgery: An Overlooked Entity?

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ABSTRACT

The idiopathic meralgia paresthetica is well known and was related with plenty of etiologies; however the bilateral meralgia paresthetica (BMP) after spine surgery, as unexpected complications, has sparsely been reported in the literature. The objective of this study is to describe the BMP and to evaluate the prevalence in the setting of low thoracic and lumbar spine surgery. During the 10-years-period from 1991 through 2001, data from every patient harboring surgical procedure on the low-thoracic, lumbar and/or sacral spine were evaluated. Eighty three patients were collected. A total of 59 patients, as having markedly sensory disturbance or younger than 15 year-old, were excluded from the study. Among the remaining 24 patients, we found five cases (20.8%) in which the BMP appeared postoperatively. The BMP was characterized by the postoperative onset of bilateral exquisite sensory disturbance upon the antero-lateral region of the thigh. All of them were young (average age of 27 years), and slender (median of Body Mass Index: 21.22 Kg/m²). Tumor removal was done for three patients and cord untethering was performed for other two patients. All patients recovered completely with conservative management for 1.5 to 11 months.

In conclusion, we reported five cases of BMP after spinal surgery in prone position. Young slender patients are at risk in contrast to idiopathic meralgia. It may be avoided by improving frame system and meticulous attention but can happen due to anatomical variation of the LFCN.

Key word: meralgia paresthetica, spine surgery, lateral femoral cutaneous nerve, complication

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Introduction

Meralgia paresthetica is an annoying but benign in course entrapment mononeuropathy affecting the lateral femoral cutaneous nerve (LFCN), which is characterized by purely sensory symptoms on the antero-lateral aspect of the thigh. In 1885, Werner Hager pioneered the first description of an injury to the LFCN [9]. The Russian Vladimir Karlovich Roth coined the term from the Greek words, meros (thigh) and algos (pain). Independently in the same year, in Berlin, Professor M. Bernhardt reported the involvement of the LFCN on this syndrome -sharing eponymy with Roth [16]. Although several pathological conditions have been proposed as the origin of this entity [2, 3, 5, 7, 8, 11, 15, 18, 20, 22],

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and the literature is spread over many different disciplines, it is likely only a few papers were wrote relating both legs.

Patients affected by meralgia paresthetica is often assumed, therefore, on the basis of a constellation of sensory complaints in the antero-lateral aspect of the thigh, namely numbness, local pain, burning, itching or other dysesthesias; on physical examination, loss of fine touch, gross touch, temperature and/or pain perception, with absence of motor and reflex abnormalities [11]. An area of hair loss may be found on the thigh due to the patient's rubbing of the thigh [22].

While the term "idiopathic meralgia paresthetica" has become well entrenched in the literature of entrapment neuropathies, the postoperative bilateral meralgia paresthetica resulting of spine surgery frequently is under documented, neglected, misdiagnosed or maybe overlooked and can mimic surgical sequelae. Unfortunately, compressive neuropathies involving lower limbs occurred as a result of ventral decubitus positioning [12].

The purpose of this communication is to characterize this complication due to prone position, investigate the prevalence and provide insight into potential mechanisms for this neuropathy.

**Materials and Methods**

**< Patient population >**

From 1991 to 2001, we reviewed the medical records, surgical techniques, and anesthesia reports of 83 Japanese patients who underwent elective low-thoracic, lumbar and/or sacral spine surgery onto full prone position. A total of 59 patients were judged to be ineligible for the study because they had histories suggestive that preoperative sensory symptoms overlapped LFCN territory, or they were less than 15 years old and unable to depict the new sensory disturbance clearly. Data obtained in five of the remainder 24 patients who were operated on prone position were retrospectively analyzed to characterize clinical and radiological features of this unusual presentation after spine surgery.

As well as the review of the clinical condition, we used the body mass index (BMI = weight(kg)/height(m)^2) as the anthropometric measurement formula, and 26.4 was set as the obese criteria for Japanese, and as borderline subjects from 24.2 to 26.4 [14].

During surgery, patients lay on the soft padded flat
Table 2
Clinical features of patients with postoperative bilateral meralgia paresthetica

<table>
<thead>
<tr>
<th>Case N.</th>
<th>Age(yrs)</th>
<th>Height(m)</th>
<th>Weight(kg)</th>
<th>BMI</th>
<th>Original disease</th>
<th>Duration of surgery</th>
<th>Time to thigh dysesthesia (days)</th>
<th>Duration of dysesthesia (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21/m</td>
<td>1.54/46</td>
<td>19.4</td>
<td></td>
<td>Spinal cord lipoma</td>
<td>7h 50m</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>21/m</td>
<td>1.71/64</td>
<td>21.8</td>
<td></td>
<td>PNET</td>
<td>10h 17m</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>36/m</td>
<td>1.82/74</td>
<td>22.3</td>
<td></td>
<td>Tethered cord and hamartoma</td>
<td>6h 05m</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>38/m</td>
<td>1.74/59</td>
<td>19.5</td>
<td></td>
<td>Spinal cord lipoma</td>
<td>6h 20m</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>19/m</td>
<td>1.74/70</td>
<td>23.1</td>
<td></td>
<td>Tethered cord syndrome</td>
<td>7h 50m</td>
<td>2</td>
<td>10.5</td>
</tr>
</tbody>
</table>

BMI: Body mass index, PNET: Primitive neuroectodermal tumor

table on full prone position with relaxed arms extended alongside patient head, or snugly retained along side torso. A transverse bolster was used just across inguinal area. The elbows and knees also were padded. The head was turned onto a T-shaped foam sponge that frees the down-side eye and ear from compression (Fig. 1). The duration of the surgery was noted as the duration of the prone position. The follow-up data were collected on regular patient visits or from the outpatient charts. The follow-up period was defined as the time elapsed between the data of surgery and when the symptoms vanished, or when the last follow-up date was available.

Results

During a 10 year-period (1991-2001), 24 patients underwent thoracolumbar and lumbosacral surgical procedure in full prone position for different ailments, without marked sensory disturbance (Table 1). We found five cases (20.8%) of post-operative sensory disturbance on the lateral aspect of the thigh, all of them bilateral.

Only young males appeared to be affected. These patients ranged in age from 19 to 38 years (mean 27 years). Of the five patients, three underwent tumor removal (one primitive neuroectodermal tumor and two spinal cord lipoma), and in two patients, cord untethering was performed. The original diseases and some clinical aspects of the patients were outlined in Table 2.

According to the clinical conditions, all five patients neither displayed a history of entrapment neuropathy, diabetes mellitus nor surgical procedure on the iliac bone. The BMI, as the antropometric unit, ranged from 19.4 kg/m² to 23.1 kg/m², with average of 21.22 kg/m².

The duration of the surgical procedure lasted from 6 hours and 5 minutes to 10 hours and 17 minutes.

The sensory complaints on the antero-lateral aspect of the thigh was named as local pain, numbness, burning, itching, aching, prickling, vague discomfort or like as alien skin. The symptom did appear with delay after the surgery. The onset was between one to 8 days after the operation (average of 3.6 days), and almost all had equal involvement of both side.

The recovery of the sensibility after nerve injury began from the periphery and could be detected within a few days. An average of 5.8 months was necessary for recovery. In four of patients, the recoveries were uniformly, however one of them, the symptoms vanished at 10 months in the left side, and one month later the right side. The earliest total
recovery was noted at 45 days. All five patients recovered with conservative management.

Illustrative Cases

<Case 4>
This 38 years-old man was admitted with a history of foot and bilateral dorsal calf numbness for five years. Further progression to lower-extremities weakness, and bladder dysfunction occurred within the last one year. Magnetic resonance images revealed the spinal canal filled by an intradural lipoma at the level of Th10 to Th 12. A routine midline approach and laminectomy was performed on full prone position. In 6 hours and 20 minutes, portion of the intra and extramedullary lipoma was removed. The procedure was uneventful, nothing untoward was observed in the recovery room. On the second postoperative day, he complained of tingling and numbness over the lateral aspect of his both thighs, although his main preoperative complaint has disappeared. Over the subsequent 6 months the
patients made a slow recovery, the thigh dysesthesia were been solved uniformly from the periphery with conservative treatment (Fig. 2).

< Case 5 >

A 19 year-old male patient had six months history of back pain and toes'tip numbness. Magnetic resonance image visualized the conus tethered to S2-S3 by a lipoma. The patient was operated on in the position described above, for 7 hours and 50 minutes. A standard L2-L5 laminectomy was performed, and the roots of the cauda equina and a thickened filum terminale were untethered gently without any technical difficulties. His preoperative symptoms of feet and back was almost abated. Two days after surgery, the patient complained of hyperesthesia along antero-lateral aspect of both thighs and developed bilateral redness spots on antero-superior iliac spine. These signs were deemed as incipient pressure sore. The neurological examination was consistent with peripheral neuropathy. The postoperative symptoms gradually diminished, the right side recovered within 10 months completely, while the sensory disturbance of the left thigh vanished in 11 months (Fig. 3).

Discussion

The Bernhardt-Roth Syndrome has been reported in association with compression and stretching injuries, in fact formerly this syndrome has also been known as British cavalry officer's disease, because of the probable constant traumatic effect of the officer's saber [3].

We described a clinical syndrome, it is characterized by the post-operative bilateral exquisitely sensory disturbance upon the antero-lateral region of the thigh of patients, who were operated in full (horizontal) prone position using the bolster. The onset was delayed to surgery and likely to occur in skinny male patients. The clinical picture did not have any causal relation to the surgical procedure. At the time of surgery, the patients did not show any sensory disturbance in the area mentioned above, and beside of the manifestation of original disease, otherwise they were healthy. The clinical course was described as having a slow but complete recovery within one year period or less. The sensibility of the LFCN territory is restored from the periphery, and it may be detected in a matter of days after the surgical intervention with conservative management. Surgical exploration of the nerve is not indicated at least in our experience.

Our cases were not directly related to the spine surgery or to the surgical procedure. None of these patients had reported symptoms of nerve entrapment preoperatively or undergone surgical procedure on the iliac bone, as mentioned in others report [2, 8, 9, 10]. Again about the patients clinical condition, apparently there was not evidence of neuropathy associated with stages of impaired glucose metabolism as suggested by recent observation study [21].

Similar clinical presentation has been described in a patient who had been sleeping on a wooden floor [19]. In line with previous reports, Mirosky highlighted almost similar rate of bilateral meralgia paresthetica (23%) in patients operated on a four-post Hall-Relton frame [13]. Additionally, two cases of bilateral meralgia paresthetica were mentioned after heart operation in frog-leg position [15].

The diagnosis is clinical because of the distinctive manifestation. Furthermore, the ability to detect this damage electrophysiologically is limited and after weeks, the electrical potential measures of chronic denervation are different from those seen in acute stages [7].

Of note, in our series, the patients were predominant slender and young adult, while the obesity has been largely mentioned as causal-related in idiopathic unilateral meralgia paresthetica [5, 11, 19, 20]. According to the obese criteria for Japanese, none of them achieved the rate of obesity, no borderline subject either. Whether this reflects a significant difference in incidence between the Westerners and Japanese remains to be seen.

The LFCN has a long and angulated course, and has two possible areas of entrapment. First is the place where the nerve emerges within the pelvis and was associated with uterine myoma, cecal tumor, appendiceal abscess and retroperitoneal lipofibrosarcoma [10]. The pelvic brim is the second place, where it was related with obesity [5],
remained an open question that the onset of symptoms took place with delay in postsurgical period. A delayed-onset of days may indicate that the nerve damage is due to a second order lesion such as ischaemia [7], or perhaps, there was a methodologic shortcoming in the postoperative neurological evaluation.

Although the nerve damage was considered temporary but not major, and corresponded to the scale 4 of the Severity of Injury Score for nerve injury [12], it prolonged hospitalization, delayed the returning to the daily life and involved a significant impact on ultimate outcome. Indeed, there are legal ramifications in perioperative nerve lesions cases. Kroll et al. examined the total database of 1,541 claims of anesthetic injuries, of various common surgical positions only the prone position was associated with claims for nerve damage, the proportion of nerve injury claims associated with the prone position (11%) was twice than of non-nerve injuries (6%). In a large proportion of that series, the exact mechanism of injury was unclear [12].

As consequence of this study, we modified our patient setting for spine surgery in order to preclude or minimize the risk of these unwanted bilateral focal peripheral neuropathies, we suggest a wide slot foam sponge frame. This soft set may minimize the direct compression over the nerve and prevent the postoperative complication (Fig. 4).

Conclusion

We reported five cases of BMP after spinal surgery in prone position. Young slender patients are at risk. It may be avoided by improving frame system and meticulous attention but can happen due to anatomical variation of the LFCN. The presence of this self-limited complication after spine surgery onto full prone position should be preoperatively informed to the patient in order to avoid liability issues.
This study was presented in part at the Poster Session of the 17th Annual Meeting of The Japanese Society of Spinal Surgery in Shizuoka, Japan, June 2002.

REFERENCES


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Reviewers comment: 藤井 清孝（北里大学医学部 脳神経外科）

Prone positionによる脊椎手術後、遲発性に生じたmaligna paresthesiaについて著者らが経験した症例をもとに著者の特徴、メカニズム、術中防止法を検討した論文である。著者の結論としてこの両側性maligna paresthesiaは比較的若齢で患者に起こりやすいという結果より、そのメカニズムとして20%程度に存在するlateral femoral cutaneous nerveの解剖学的走行の変異に加え、術中の長時間体位が関与しているのではないかと推定している。Maligna paresthesiaは以前には腸骨片採取時に生じる外側大腿筋皮神経の直接損傷などで時に経験された読者も少なからずあると思われる。しかし、本論文の神経損傷のメカニズムは異なるており、特に遅発性に生じることから虚血などのメカニズム関与の可能性も示唆されている。今後は著者らが主張しているように手術体位とパッドなどの装具の改良で容易に防止できる合併症と考えられる。手術後見逃しやすい遅発性の不快な症状に対して注意を喚起し、その原因の推定と防止法を提示した点で本論文は価値があると思われる。

Reviewers comment: Nobuhito Morota, M.D.

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The authors successfully documented a rare complication of bilateral meralgia paresthesia which could occur after spinal surgery.

Postoperative meralgia paresthesia is one of several ominous complications which may occur subsequent to prone surgery. Despite its relatively high frequency, recognition of this complication seems not well acknowledged among Japanese neurosurgeons. From this viewpoint, I think the paper is worth reading to raise awareness of meralgia paresthesia.

Key factors for the development of meralgia paresthesia. I think, seem to be positioning of the patient, and the length of surgery. The original prone position described by the author was the full flat prone position which would compress the iliac crest directly. I usually use chest rolls and soft padding on the iliac crest and the knee while the O.R. bed is flexed to extend the lumbar region. I this position, the gravity force is diverted and less compression force is placed on the iliac crest. (Please see the picture, below.) In addition, this flexed position helps the surgeon expose the lumbosacral lesion easily, leading to shorter operative time that could prevent the development of meralgia paresthesia.

I hope the paper will provide practical knowledge to prevent meralgia paresthesia following prone surgery.

Operative position of a 10-year-old boy with tethered spinal cord syndrome.