

Early View Article: Online published version of an accepted article before publication in the final form.

Journal Name: Journal of Case Reports and Images in Orthopedics and Rheumatology

Type of Article: Case Report

Title: Retroperitoneal hematoma presenting as acute meralgia paresthetica: Case report, review of literature and cadaveric demonstration

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doi: To be assigned

Early view version published: September 7, 2016

**How to cite the article:** Satpathy J, Mounasamy V, Golladay G, Reynolds JP. Retroperitoneal hematoma presenting as acute meralgia paresthetica: Case report, review of literature and cadaveric demonstration. Journal of Case Reports and Images in Orthopedics and Rheumatology. Forthcoming 2016.

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27 **Short Running Title:** Retroperitoneal hematoma presenting as meralgia  
28 parasthetica

29

30 **Guarantor of Submission:** The corresponding author is the guarantor of  
31 submission.

32

33 **SUMMARY (OPTIONAL)**

34 Spontaneous retroperitoneal hematoma is a rare condition that is often associated  
35 with anticoagulation therapy. Femoral nerve compression from a retroperitoneal  
36 hematoma has been widely reported in literature. There has been a case of reported  
37 femoral and lateral femoral cutaneous nerve compression however no published  
38 reports describe isolated lateral femoral cutaneous nerve compressive symptoms  
39 resulting from a retroperitoneal hematoma.

40 This report describes the case of a patient who presented to the emergency  
41 department with ankle and thigh pain from a minor trauma. The patient was  
42 diagnosed with an ankle sprain and a non-specific soft tissue injury of the thigh. Her  
43 thigh pain continued and she was subsequently diagnosed with meralgia  
44 parasthetica, which was confirmed with a lateral femoral cutaneous nerve block. She  
45 subsequently complained of lower left quadrant abdominal pain and a review of  
46 medical history revealed chronic anticoagulation treatment for a prior mitral valve  
47 replacement. Imaging eventually revealed an iliopsoas hematoma in the setting of an  
48 INR of 14.2. She was treated non-operatively and made a full recovery. A cadaveric  
49 study was performed demonstrating visible stretching of the lateral femoral  
50 cutaneous nerve as fluid was injected into the iliacus muscle.

51 A retroperitoneal hematoma is a potentially life threatening condition which most  
52 commonly occurs in patients with a bleeding diathesis or those receiving  
53 anticoagulation therapy. This case demonstrates a rare presentation of a  
54 retroperitoneal hematoma that manifested as isolated lateral femoral cutaneous  
55 nerve compression. This case emphasizes the importance of a thorough history  
56 even in the setting of minor musculoskeletal trauma.

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65 report, review of literature and cadaveric demonstration

66

## 67 **ABSTRACT**

68

### 69 **Introduction**

70 Spontaneous retroperitoneal hematoma is a relatively rare condition that usually  
71 occurs in patients receiving anticoagulation therapy or those with a history of  
72 hemophilia. The presentation may vary from mild abdominal discomfort to acute  
73 hemodynamic collapse. Given the potential for exsanguination, it is important to  
74 detect this potentially life-threatening condition early for appropriate management.

75

### 76 **Case Report**

77 In this report, we discuss an uncommon presentation of a retroperitoneal hematoma  
78 in which the patient initially sought treatment for thigh and ankle pain related to a  
79 recent minor trauma. During the course of her evaluation over several days, a  
80 diagnosis of acute meralgia paresthetica was entertained and treated with relief of  
81 her symptoms. However, an evolving retroperitoneal hematoma was subsequently  
82 identified as the cause of her condition.

83

### 84 **Conclusion**

85 Physicians should be aware of this seemingly benign presentation of a life-  
86 threatening retroperitoneal hematoma to avoid delays in diagnosis and treatment as  
87 described in this report.

88

89 **Keywords:** Retroperitoneal, Iliopsoas Hematoma, Meralgia Paresthetica

90

91

92 **TITLE:** Retroperitoneal hematoma presenting as acute meralgia paresthetica: Case  
93 report, review of literature and cadaveric demonstration

94

## 95 **INTRODUCTION**

96 Spontaneous retroperitoneal hematoma is a relatively rare complication mostly  
97 associated with anticoagulation therapy [1-7]. Femoral nerve compression  
98 associated with an iliopsoas or retroperitoneal hematoma is widely reported in the  
99 literature [1-3, 6, 7]. A combination of femoral neuropathy and meralgia paresthetica  
100 has been described in literature as a result of a traumatic iliacus hematoma [8].  
101 However, isolated symptoms of acute lateral femoral cutaneous nerve compression  
102 are rare and frequently dismissed due to benign causes in the otherwise healthy and  
103 ambulatory patient. This case demonstrates an unusual presentation of a potentially  
104 life threatening condition. Upon review of the literature, and to our knowledge, these  
105 circumstances have not been previously reported. The seemingly benign nature of  
106 this patient's initial symptoms created a diagnostic dilemma and led to a delay of  
107 diagnosis and management. This case is presented to alert health care professionals  
108 of potential underlying, life-threatening pathology when considering a diagnosis of  
109 meralgia paresthetica and soft tissue injury.

110

## 111 **CASE REPORT**

112 Our case is that of a 56 year old woman who presented to the emergency  
113 department with acute, anterior-lateral thigh pain following an injury to the left ankle  
114 three days prior. She reported a history of acute hyper-flexion of left ankle while  
115 trying to get up from a chair. She was able to bear weight with minimal pain in the  
116 ankle. Her ankle injury was considered a sprain, and her thigh symptoms were  
117 addressed with a non-specific diagnosis of "soft tissue injury".

118 Two days later, she returned to the emergency room with increasing pain in the left  
119 anterior-lateral thigh and mild pain in left ankle. She was assessed clinically. No  
120 imaging studies were obtained. Again, a diagnosis of soft tissue injury was made,  
121 and she was discharged home with analgesia.

122 Twelve hours later, the patient returned to emergency department with escalating  
123 thigh and groin pain. She was unable to bear weight. Additionally, she was unable to

124 fully extend the left hip due to her discomfort. She had a characteristic flexion and  
125 external rotation attitude. Radiographs of the hip and knee did not reveal any bony  
126 injury. On examination, the pain distribution corresponded to that of the lateral  
127 femoral cutaneous nerve of left thigh. She had a sensory deficit in the distribution of  
128 lateral femoral cutaneous nerve as well. Sensation in the remainder of the limb was  
129 otherwise normal. Distal pulses were normal. She also had quadriceps power of only  
130 four out of five on standard scales, which was attributed to pain. An orthopaedic  
131 surgery consult was requested with confirmation of the examination outlined above.  
132 Concurrently, given her history, a diagnosis of acute meralgia paresthetica was  
133 entertained and confirmed with a local block to the lateral femoral cutaneous nerve  
134 with dramatic relief of her thigh pain and improvement in motor function.

135 The patient's vital signs remained stable with a normal blood pressure but sinus  
136 tachycardia. In the course of her orthopaedic evaluation, her medical history was  
137 reviewed and found to be remarkable for a previous mitral valve replacement and  
138 chronic anticoagulation with warfarin. In the next hour, as her thigh pain abated from  
139 the local block, she recognized left lower quadrant abdominal and flank pain, which  
140 was not previously recognized. She was found to be tender to palpation in these  
141 regions as well. Radiographs of the abdomen demonstrated a widened psoas  
142 shadow on the left side (Figure 1). Concurrently, laboratory results revealed an  
143 elevated INR of 14.2. A provisional diagnosis of retroperitoneal hematoma was  
144 made. An urgent computed tomography scan confirmed an expanding hematoma  
145 involving the left iliopsoas muscle (Figures 2 and 3).

146 The patient was treated with Vitamin K and fresh frozen plasma to reverse her  
147 coagulopathy and was resuscitated with blood transfusions. Her anticoagulation  
148 status was monitored, and the hematoma was followed by serial computed  
149 tomography scans. No surgical interventions were required. She made a complete  
150 recovery with non-operative management. At her last follow up, she was ambulatory  
151 and had no residual neurologic deficits.

152

### 153 **Anatomical Considerations**

154 We performed a cadaveric study to determine whether isolated swelling of iliacus or  
155 psoas muscle or a combination of both will produce stretching of the lateral femoral

156 cutaneous nerve. A fresh cadaver was dissected. The lateral femoral cutaneous  
157 nerve was exposed. Care was taken to protect the iliopsoas fascia while dissecting  
158 the nerve. Once the nerve was dissected out, this was marked at 2 specific points  
159 along its course using black marker as shown in image 4.

160 As we injected fluid into the iliacus muscle, it started expanding and the nerve  
161 appeared to be visibly stretched. However, once we injected 150mls of volume, the  
162 iliacus compartment stopped expanding and fluid began to back track from the  
163 injection site suggesting to us that the compartment had reached its maximum  
164 pressure and would no longer expand under our experimental conditions.

165 We repeated the dissection on the contralateral side and injected fluid into psoas  
166 muscle. The psoas compartment immediately expanded, however after achieving a  
167 certain dimension the muscle stopped expanding with additional fluid. We were able  
168 to inject a large volume of fluid under low pressure to the psoas muscle without any  
169 further expansion. Visually, this fluid volume did not seem to have any effect on the  
170 lateral femoral cutaneous nerve. In the same side, we injected into the iliacus muscle  
171 and results were similar to our previous experiment on the iliacus muscle in the  
172 contralateral side.

173 Our experiment suggested that an iliopsoas hematoma would stretch the lateral  
174 cutaneous nerve. Under our experimental conditions we were unable over expand  
175 the iliacus muscle as fluid back tracked from the needle injection track. However, in  
176 vivo, it is likely that the tissue will expand further which would explain severe lateral  
177 femoral cutaneous paraesthesia symptoms.

178

## 179 **DISCUSSION**

180 The lateral femoral cutaneous nerve of thigh is a branch of lumbar plexus. It arises  
181 from the dorsal divisions of the second and third lumbar nerves. It emerges from the  
182 lateral border of the psoas major mid-substance and crosses the iliacus muscle over  
183 its sheath obliquely towards the anterior superior iliac spine. It then passes under the  
184 inguinal ligament and over the Sartorius muscle into the thigh where it divides into  
185 anterior and posterior branches. The nerve is most vulnerable to compression as it  
186 emerges from beneath the inguinal ligament but anterior to the iliopsoas muscle [9].  
187 It then passes around the anterior superior iliac spine, courses through the fibrous

188 canal of the fascia lata, and finally exits the fascia lata several centimetres distally  
189 into the subcutaneous thigh. Considering the anatomic course of the lateral femoral  
190 cutaneous nerve in relation to the iliopsoas muscle, one would expect an iliopsoas  
191 hematoma to produce lateral cutaneous femoral nerve compression. However, in  
192 these cases, isolated Meralgia Paresthetica is a rare manifestation as opposed to  
193 overt femoral nerve compression as previously reported [1-3, 6, 7].

194 The described case is unusual because the initial presenting symptoms were largely  
195 sensory and localized to the distribution of the lateral femoral cutaneous nerve. It is  
196 clear from the experimental study of Goodfellow et al that isolated Psoas hematoma  
197 is unlikely to give rise to nerve compression symptoms [6]. They demonstrated that  
198 Psoas fascia is thin and distensible and can contain large amount of fluid at a low  
199 pressure. They further demonstrated that the iliac fascia is also thin except at the  
200 lower portions where it blends with psoas sheath. The iliacus compartment can  
201 contain very small volume and starts distending at the thinner fascial layer first and  
202 subsequently expands up the psoas compartment as more volume is accumulates  
203 [6, 10]. It is at this point the hematoma starts compressing the femoral nerve in the  
204 sheath. It is clear from the CT scan shown in our article that both iliacus and psoas  
205 muscles are grossly enlarged. We think that both the muscles were primarily injured  
206 and that bleeding occurred directly into both sheaths rather than an iliacus  
207 hematoma expanding into the psoas. Relatively early intervention could have  
208 prevented a compression of femoral nerve in our case.

209 We are aware of variations in the course of lateral femoral cutaneous nerve and  
210 presume that one of the anatomic variations in its course might have predisposed  
211 the nerve to be stretched during this patient's previously described "stumbling" injury  
212 [9, 11]. However, due to the acute nature of this process, our patient did not undergo  
213 electromyographic studies to delineate the specifics of her neurologic condition. She  
214 responded favorably to a local block of the lateral femoral cutaneous nerve with an  
215 associated improvement in hip flexor motor function. Given the dramatic response to  
216 the local injection and improved muscular function, previously noted motor deficits  
217 were attributed to pain.

218 The majority of reports in the literature recommend nonoperative treatment of this  
219 condition with aggressive reversal of anticoagulation therapy leading to good results



220 [12-15]. This includes withdrawal of anticoagulation therapy, correction of  
221 coagulopathy, intravenous fluid resuscitation and supportive measures [15]. Merrick  
222 et al showed success in ultrasound-guided aspiration in similar conditions. They  
223 concluded that aspiration of even a small volume of the hematoma yields good  
224 symptomatic relief and minimizes compression of the associated nerves [16]. Lastly,  
225 the concept that a spontaneous retroperitoneal hematoma develops as the result of  
226 diffuse microvascular bleeding has been recently challenged by successful treatment  
227 with selective arterial embolization [17,18]. Parmer et al in a report of four cases  
228 concluded that even in the event of non-progressive neurologic deterioration without  
229 active bleeding, surgical decompression yields good long-term results with minimal  
230 neurologic deficit [19].

231 Non-operative treatment was successful in our patient despite the delay of diagnosis  
232 over several days. In our opinion, conservative management is a reasonable option  
233 in cases where the patient remains hemodynamically stable. Serial computed  
234 tomography scans are recommended to confirm resolution of the hematoma.

235 Lastly, it is important to note that this patient's underlying condition was only unveiled  
236 after a thorough review of the medical history. This led to laboratory testing of her  
237 anticoagulation status. Concurrently, the lateral femoral cutaneous nerve block  
238 assisted in unmasking her flank and abdominal pain, which prompted the diagnostic  
239 studies that led to her diagnosis. This report is submitted in an effort to emphasize  
240 the importance of a thorough history and physical examination and also to show an  
241 unusual presentation of retroperitoneal hematoma when evaluating minor  
242 musculoskeletal trauma.

243

## 244 **CONCLUSION**

245 An iliopsoas, retroperitoneal hematoma is a potentially life threatening condition  
246 which most commonly occurs in patients with a bleeding diathesis or those receiving  
247 anticoagulation therapy. Early detection is paramount to prevent exsanguination.  
248 This case is an unusual presentation as the patient's initial symptoms were isolated  
249 to thigh and ankle pain subsequent to stumbling while getting out of a chair. This led  
250 to a delay in diagnosis of the underlying, life threatening condition. As demonstrated

251 in this case, a thorough history should be performed on all patients presenting with  
252 minor musculoskeletal trauma.

253

#### 254 **CONFLICT OF INTEREST**

255 There are no conflicts of interest to report

256

#### 257 **AUTHOR'S CONTRIBUTIONS**

258

259 Jibanananda Satpathy, MD

260 Group1 - Conception and design, Acquisition of data, Analysis and interpretation of  
261 data

262 Group 2 - Drafting the article, Critical revision of the article

263 Group 3 - Final approval of the version to be published

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266 Group1 – Conception and design, Analysis and interpretation of data

267 Group 2 - Drafting the article, Critical revision of the article

268 Group 3 - Final approval of the version to be published

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273 Group 3 - Final approval of the version to be published

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276 Group 2 - Drafting the article, Critical revision of the article

277 Group 3 - Final approval of the version to be published

278

#### 279 **ACKNOWLEDGEMENTS**

280 None to report

281

282

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### 336 337 **FIGURE LEGENDS**

338  
339 Figure 1: AP Abdomen X-Ray showing enlarged left Psoas shadow

340  
341 Figure 2: CT scan showing enlarged left psoas muscle with displaced left kidney

342  
343 Figure 3: CT scan showing enlarged left iliacus and psoas muscle with evidence of  
344 active bleeding

345

346 Figure 4: Exposed lateral femoral cutaneous nerve and injection of fluid into iliacus  
347 muscle

348

349 Figure 5: Visible distention of iliacus muscle and lateral femoral cutaneous nerve  
350 following injection of 150cc of fluid.

351

352 **FIGURES**

353

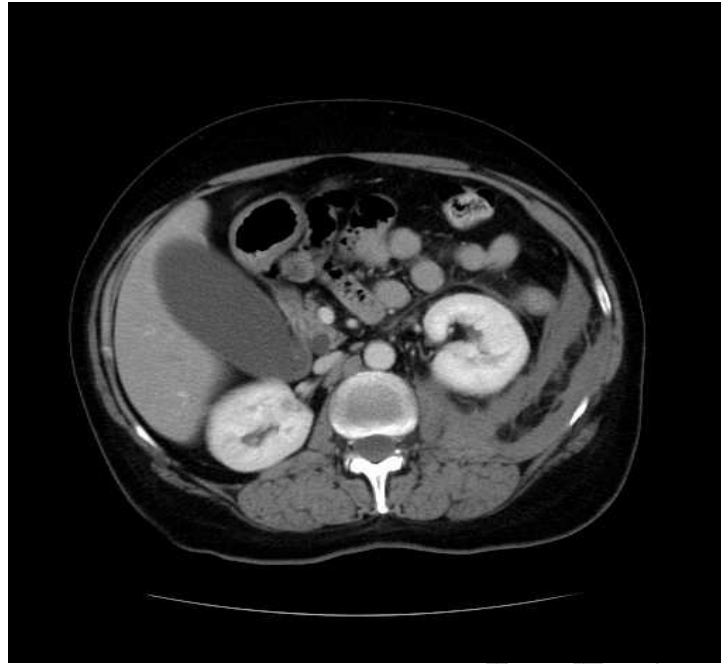


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356 Figure 1: AP Abdomen X-Ray showing enlarged left Psoas shadow

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360 Figure 2: CT scan showing enlarged left psoas muscle with displaced left kidney

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EARLY VIEW



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367 Figure 3: CT scan showing enlarged left iliacus and psoas muscle with evidence of  
368 active bleeding

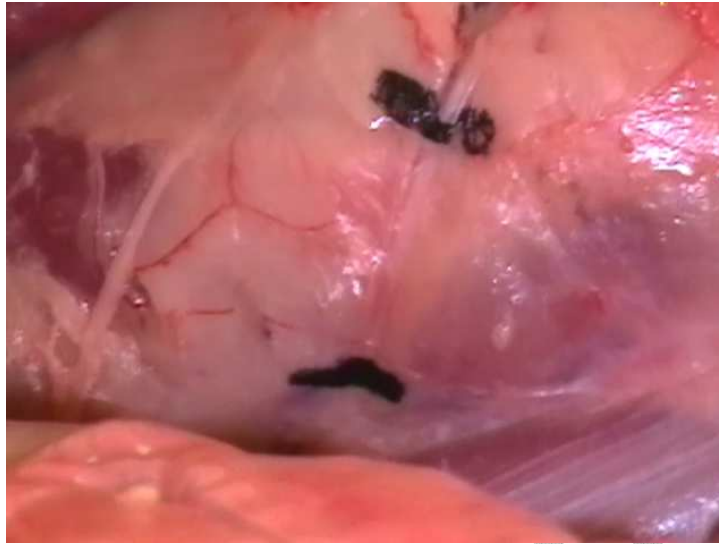
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371

372 Figure 4: Exposed lateral femoral cutaneous nerve and injection of fluid into iliacus  
373 muscle



374

375

376 Figure 5: Visible distention of iliacus muscle and lateral femoral cutaneous nerve

377 following injection of 150cc of fluid.

EARLY VIEW