Sciatic nerve endometriosis explained by perineural spread

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Objectives

Sciatic nerve endometriosis (EM) is a rare manifestation of EM and the mechanism of involvement remains enigmatic. Our group previously described an anatomic explanation for neoplastic lumbosacral plexopathy in various pelvic cancers including cervical cancer.[1] We believe that EM can spread from the uterus to the lumbosacral plexus (LSP) along the pelvic autonomic nerve[3] analogously to pelvic tumors[1]. We present three cases in which we believe imaging strongly supports our theory. We also performed sequential imaging in one case, which provides insight into catamenial symptoms of sciatic nerve EM. To further support our theory, we reviewed all published cases of neural involvement in EM and selected those suggestive of perineural spread.

Methods

A) We retrospectively reviewed all available data of 3 cases of sciatic EM. All demographic data (age, gender), initial and presenting symptoms, electrodiagnostic studies, imaging studies, biopsy results, treatment and follow-up status were reviewed in detail.
B) Our group performed a review of all cases of neural involvement in EM.[4] We reviewed the database and selected cases supportive of our mechanism. We obtained the original MRIs from one randomly selected previously published case and reinterpreted the imaging in detail.

Results A

Three female patients were identified; average age was 42 years (32-49 years). (Table 1) The left sciatic nerve was involved in 2 cases, the right in 1. All patients initially complained of progressive sciatic pain, but presented with a combination of pain and weakness with or without numbness. Electrodiagnostic studies demonstrated sciatic neuropathy and/or lumbosacral plexopathy in all. On imaging the sciatic nerve and L4-S1 spinal nerves were commonly affected; the nerves were enlarged, hyperintense on T2WI and enhancing on gadolinium enhanced scans. (Fig.) In 2 cases we could recognize an enhancing dense tissue abnormality extending from the uterus to the sacral plexus, possibly representing involvement of the autonomic nervous system. (Fig.) One patient underwent total abdominal hysterectomy – bilateral salpingo oophorectomy (TAH-BSO) with sacral plexus neurolysis, which demonstrated intraneural EM; one patient had positive percutaneous biopsy of the sciatic notch tissue and one was diagnosed with sciatic EM based on imaging, clinical presentation and a response to treatment. One patient had co-existent peritoneal EM, in one patient this was excluded by surgery and one did not have peritoneal EM reported. Average follow-up was 22.6 months. All patients improved, two after hormonal treatment and one after TAH-BSO.

Results B

We reviewed all reported cases of somatic nerve involvement in EM. Altogether we identified 365 cases; the most frequently affected nerves are the sacral and LSP (56%, n=211) followed by the sciatic nerve (38%, n=140). Other nerves were the obturator (1%, n=5), sup. and inf. gluteal (1%, n=4), femoral (1%, n=3), pudendal (<1%, n=2), peroneal (<1%, n=1) and ilioinguinal nerves (<1%, n=1). Where possible, we established the level of intraneural invasion (31%, n=113); of these, 34% (n=38) cases were intraneural, 21% (n=24) were intraneural with extraneural extension and 45% (n=51) were described to extrinsically compress the nerve without any nerve invasion. In the solely intraneural subgroup 89% (n=33) had no peritoneal EM. In addition we retrieved the MRIs from one randomly selected case from the literature[2]. In this patient we observed a markedly enlarged sciatic nerve, which appeared to be infiltrated by the surrounding heterogenous soft tissue mass, which also extended along the L4-S1 spinal nerves. Similarly as in our cases we identified an abnormality extending from the uterus to the LSP.

Table 1

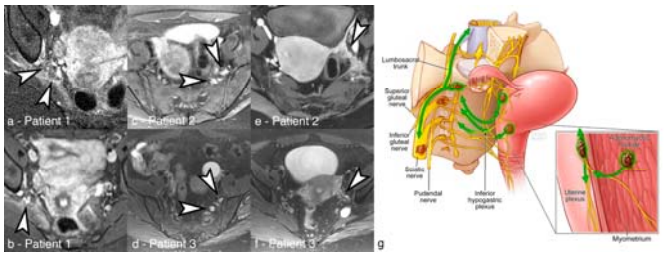
Patient No.	Age, Sex	Laterality	Symptoms			EMG	Peritoneal disease	Imaging			Biopsy	Treatment and Response
			Initial Symptom	Duration of Symptoms (months)	Presenting Symptoms			Involved peripheral nerves	Other lesions	Pathway of spread		
1	32, F	R	P	23	P, W	R LSP	Yes	Sciatic n.	Obturator internus m., piriformis m., ischium	No	N/A	Hormonal therapy; improved
2	45, F	L	P	48	P, W, N	L sciatic n.	No	L4-S2, sciatic n.	Obturator internus m.	Yes	Sciatic notch, open, positive	TAH-BSO, neurolysis; improved
3	49, F	L	P	20	P, W, N	L LSP	No	L4-S1, sciatic n.	No	Yes	Sciatic notch, percutaneous, positive	Hormonal therapy; improved

R – right, L – left, P – pain, W – weakness, N – numbness, LSP – lumbosacral plexus, N/A – not available, n. – nerve, m. – muscle

Discussion

We propose that EM can infiltrate the uterine plexus, part of the larger inferior hypogastric plexus (IHP). From the IHP EM extends along the sacral and pelvic splanchnic nerves to the sacral plexus and along the hypogastric nerves to the lumbar plexus. From the LSP it can continue to spread distally to the branching nerves such as the sciatic or gluteal nerves or proximally to the spinal nerves and theoretically intradurally. (Fig. g) Curiously we found EM lesions in the obturator internus muscle and in the ischium in similar pattern as has been described in pelvic cancer; we believe these lesions are results of perineural spread as well. In two cases we were able to observe a band of dense tissue extending from the uterus to the LSP; we theorize that this abnormality represents spread along the autonomic nerves. We believe that our theory is further supported by the review of the literature, particularly by the subgroup of LSP EM with no peritoneal disease and by the case, in which we retrieved and re-reviewed imaging.

Figure



Legend: The L5-S1 spinal (a - arrowheads; axial gadolinium enhanced T1 image) and sciatic nerve (b - arrowhead; axial T2 image) were prominently enlarged and infiltrated by the surrounding soft tissue mass in patient 1. The L5-S1 spinal nerves were analogously enlarged and hyperintense in patients 2 and 3 (c,d - arrowheads; axial T2 fat-suppressed images). In both patients we could observe an enhancing (e – arrowhead; axial gadolinium enhanced spoiled gradient echo image) and hyperintense (f – arrowhead; axial T2 fat-suppressed image) abnormality extending from the uterus to the LSP. The proposed route of spread is depicted in an illustration. (g; ©2015 Mayo Foundation for Medical Education and Research. All rights reserved.)

Conclusions

We believe that our clinical observation together with the review of literature supports perineural spread as an alternate mechanism of EM of nerve and provides an explanation for otherwise puzzling cases.

References

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