CASE REPORT

A unique case of gliomatosis peritonei in a man, following a retroperitoneal teratoma

Meera Chauhan,¹ Roger Kockelbergh,² Guy Faust¹

¹Department of Oncology, University Hospitals of Leicester NHS Trust, Leicester, Leicestershire, UK

²Department of Urology, University Hospitals of Leicester NHS Trust, Leicester, Leicestershire, UK

Correspondence to

Dr Meera Chauhan,
meera.chauhan@doctors.org.uk

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SUMMARY

We present an unusual case of a 56-year-old man presenting with abdominal swelling. Imaging revealed a large abdominal 23 cm cystic mass, which radiologically appeared to be related to the small bowel. There was an attempted surgical removal by the general surgeons. It was histologically confirmed as a retroperitoneal cystic teratoma with immature neural elements with incomplete resection margins. Residual disease was found at re-imaging 3 months later and a further block dissection was performed, with histology confirming recurrence. Thirteen months later, imaging revealed recurrent disease with peritoneal involvement. At laparoscopic exploration, there was peritoneal seeding, and biopsies confirmed a diagnosis of gliomatosis peritonei, secondary to the retroperitoneal teratoma. The patient proceeded to have combination chemotherapy to achieve stable disease on imaging. A month after completion, sadly, the disease progressed; the patient received best supportive care.

BACKGROUND

Retroperitoneal teratomas are relatively rare and account for up to 11% of primary retroperitoneal tumours.¹ They usually occur in the first 6 months of life and in adolescents.² Gliomatosis peritonei (GP) is a rare condition characterised by the presence of numerous peritoneal nodules consisting of glial tissue, and can be seen as an uncommon complication of ovarian teratomas.³ We present the case of a 56-year-old man with a primary retroperitoneal teratoma, who developed subsequent GP.

CASE PRESENTATION

A 56-year-old man presented to his general practitioner with a gradual history of abdominal swelling. He was previously well with a medical history of hypertension, for which he was on amlodipine 10 mg once daily. He had a performance status of 0, was a life-long non-smoker and drank alcohol only occasionally. He had no family history of medical problems.

INVESTIGATIONS

An abdominal ultrasound scan arranged by primary care revealed a 20 cm abdominal cyst. A follow-up CT of the abdomen detailed this as a solitary 23 cm mass (figure 1), closely related to the upper abdominal small bowel loops. It was anterior to the left renal vein and artery. There was no other evidence of disease.

TREATMENT

A surgical opinion was sought and the patient underwent a laparotomy. He had a surgical resection of a 15 cm multiloculated retroperitoneal abdominal mesenteric cyst with macroscopic clearance. The histology of this lesion confirmed a retroperitoneal cystic teratoma with immature neural elements, with microscopically incomplete resection margins. He made an unremarkable recovery postsurgery and returned to work.

As the histology revealed a teratoma, a scrotal ultrasound scan was performed, showing that the testes appeared normal, although there was atrophy on the left side and a grade 1 left varicocele. Tumour markers including β human chorionic gonadotropin, lactate dehydrogenase and α -feto protein, at this time, were normal.

An early staging scan was organised 3 months postoperatively, showing residual para-aortic disease, 12 cm in length and 4 cm in diameter, between the left renal vein and the aortic bifurcation. No other metastatic disease was shown. The patient was asymptomatic.

Five months after his primary surgery, our patient underwent a further resection for the residual disease, with a re-do block dissection of the para-aortic nodes. The histology of the residual disease confirmed retroperitoneal teratoma differentiated. Histopathologically, it showed fibrous fatty tissue with native nerves and ganglia. There was an irregular collection of mature and immature glial tissue resembling brain tissue in the specimen, with some lining the cystic structures. There were differentiated cartilaginous elements and few

Figure 1 CT of the abdomen showing the large abdominal mass on initial presentation.

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Figure 2 H&E-stained histology section of the lymph node containing glial cells.

mature differentiated ciliated epithelial elements. Surrounding this was a florid foreign body type giant cell response to cholesterol crystals. Glial elements appeared focally close to the resection margin, and were completely excised. One lymph node found contained glial tissue—therefore, the tumour had metastasised into the retroperitoneal lymph nodes ([figure 2](#)).

OUTCOME AND FOLLOW-UP

A re-staging CT scan showed no evidence of recurrence, but demonstrated a left hydronephrosis at the level of surgical clips. This was investigated by subsequent cystoscopy and left retrograde review, showing no obstruction, indicating that the hydronephrosis had spontaneously regressed. Tumour markers remained normal when repeated at both 6 and 9 months postsurgery.

A staging CT scan 13 months post re-do surgery showed disease progression with an aortocaval node size increase, mesenteric nodal size increase, and increased nodularity and stranding in the fat of the left upper quadrant and left para-colic region. There was also a small volume of ascites demonstrated around the liver and the spleen ([figure 3](#)).

Two months later, the patient underwent a laparoscopy, which revealed white plaques and inflammatory looking adhesions over the peritoneum. Peritoneal biopsies were taken; histologically, these showed a malignant tumour seen as single cells

Figure 3 CT of the abdomen showing the progression of disease with peritoneal stranding and nodularity.

Figure 4 H&E-stained histology section of peritoneal biopsy showing glial cell deposits, with the immunohistochemistry showing positive glial fibrillary acidic protein (GFAP) staining (insert).

beneath the peritoneal lining. The cells appeared plump and epithelioid with some slightly spindled variants. On immunohistochemistry, the cells showed strong positive staining for glial fibrillary acidic protein (GFAP), and no staining for BP4, CEA, Melan-A, HMB45 or OCT3/4 ([figure 4](#)). The pathologists felt the peritoneal biopsies were consistent with a diagnosis of GP. As the previously reported teratoma had abundant neural tissue, it was most likely gliomatosis secondary to the teratoma.

The patient then noticed a change in his bowel habits. Owing to this and the progression of disease noted on the CT scan and laparoscopy, he was advised to consider chemotherapy treatment with carboplatin and etoposide. It was explained to him and his family that, sadly, his condition was no longer curable. A further CT staging scan a month after laparoscopy showed progression of the peritoneal disease and the patient decided to start chemotherapy treatment.

He was reviewed after the first cycle of treatment. During the cycle, he had required a hospital review for diarrhoea. His next dose of intravenous etoposide was reduced due to a low neutrophil count and he was advised to take loperamide. Cycle 2 of treatment was much better tolerated. An interval treatment CT scan showed stable disease with incidental bilateral pulmonary emboli, for which he was started on anticoagulation therapy. By cycle 5 of chemotherapy, the patient was suffering from increasing toxicities, including fatigue and diarrhoea—the decision was made with the patient to stop treatment and observe the disease.

One month post chemotherapy, a CT scan showed progression of disease, with gross ascites, multiple peritoneal nodules and extensive peritoneal thickening. Clinically, the patient had a distended abdomen, and was suffering from constipation and loss of appetite. Further palliative chemotherapy was discussed with the patient, although it was explained that response rates were unknown and toxicities were likely to be significant. The patient made the informed decision to not receive further chemotherapy and was referred across to palliative care for best supportive care. Further symptoms of increasing abdominal distention and an associated left popliteal deep vein thrombosis (while on treatment dose anticoagulation) were experienced by the patient. Sadly, he died around 2 months later.

DISCUSSION

GP is a rare condition characterised by the presence of numerous peritoneal nodules consisting of glial tissue, and can be seen

as an uncommon complication of ovarian teratomas.^{3–4} A few rare cases of GP have been reported where the primary teratoma is not of ovarian origin, and unusually, the teratoma is not from a midline structure. These cases are largely in the paediatric population and include examples of a primary gastric and gallbladder teratoma.^{3–5} Cases of GP have also been reported as a complication of ventriculoperitoneal shunts, where it is proposed that glial cells are transported from the nervous system in the cerebrospinal fluid, into the peritoneal cavity, due to the presence of the shunt.⁶ In our case, the GP was a complication of a retroperitoneal teratoma in an adult male.

Previous reports show that the nodules of GP are made up of mature glial tissue and occasionally other teratomatous elements can be seen.⁴ The behaviour of GP observed in ovarian teratomas is usually slow and benign, as the differentiated cells do not possess high proliferation rates. However, it has been noted that in the few cases of GP in non-ovarian teratomas, the behaviour of GP varies and it can often present with large omental masses that progress rapidly.⁷

Studies looking at the histology of GP show that the primary ovarian teratomas are of varying immaturity, but are predominantly neural, with well-differentiated glial tissues and neuroectodermal elements. The corresponding GP histology shows up to 1 cm nodules that consist of glial cells with mature features.

The pathogenesis of GP remains unclear and under investigation. One theory is that implantation of immature neural cells into the peritoneum occurs after a teratoma capsular rupture, occurring either spontaneously or surgically. This leads to peritoneal seeding, where the cells then mature into glial tissue to cause the gliomatosis.⁷ This theory is supported by the fact that GP is found to contain glial as well as other tissues that have arisen from the teratoma. Lymph node involvement with mature glial tissues indicates lymphatic transport of immature neural cells in the primary. Finally, the cases of GP associated with VP shunts support the theory of implantation of cells.^{6–7}

A potential alternative theory is that GP arises from non-malignant stem cells that respond to their environment to differentiate into glial tissue.⁷ This arises from studies showing that the GP deposits are genetically unrelated to the original teratoma, when compared using molecular analysis.⁸ Müllerian pluripotent stem cells found on the peritoneal surface and mesenchyme could potentially differentiate to form GP via this route. Studies have suggested that the microenvironment of a stem cell can cause various differentiation pathways. In this way, teratomas with a glial component could secrete growth factors to cause glial differentiation on the peritoneum.^{7–8}

In our case, the original histology of the 23 cm mass was predominantly immature neural tissue in the retroperitoneal teratoma. The subsequent re-do retroperitoneal lymph node dissection revealed lymph node involvement with both immature neural tissue and mature glial tissue. The peritoneal biopsies were macroscopically and microscopically consistent with other descriptions of GP, and importantly, the tissue had strong staining for GFAP, which is an intermediate filament found in astroglial cells. This shows that the peritoneal tissue contained mature neural tissue, and the pathogenesis of this could be via glial implantation via surgical seeding, through lymphatic

transport via the involvement of the lymph nodes or via metaplasia of the stem cells at the peritoneum through secretion of growth factors.

As far as we know, this is the first case of an adult male being diagnosed with GP following a retroperitoneal germ cell tumour. The patient's tumour behaved in an increasingly aggressive manner, representing its transformation into glial tissue. Unfortunately, his tumour recurred despite surgical resections, and behaved in a chemoresistant manner, unlike most germ cell tumours but reflecting case reports of some patients with GP.

Learning points

- ▶ Primary retroperitoneal teratomas account for up to 11% of all retroperitoneal tumours, and are generally rare in adults.
- ▶ Gliomatosis peritonei is a documented rare complication of teratomas—this appears to be the first documented case in an adult male, following a retroperitoneal germ cell primary tumour.
- ▶ The pathogenesis of gliomatosis peritonei is still under investigation but could be due to implantation of immature neural cells into the peritoneum following teratoma capsular rupture.
- ▶ Alternatively, Müllerian pluripotent stem cells on the peritoneal surface could differentiate to form GP, via the secretion of growth factors and stimulation of the microenvironment.
- ▶ Owing to the rarity of the condition, all patients should be managed using a multidisciplinary approach to optimise care for the patient.

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Competing interests None declared.

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REFERENCES

- 1 Mathur P, Lopez-Viego MA, Howell M. Giant primary retroperitoneal teratoma in an adult: a case report. *Case Rep Med* 2010;2010:650424.
- 2 Gatcombe HG, Assikis V, Kooby D, et al. Primary retroperitoneal teratomas: a review of the literature. *J Surg Oncol* 2004;86:107–13.
- 3 Yeo DM, Lim GY, Lee YS, et al. Gliomatosis peritonei of the scrotal sac associated with an immature gastric teratoma. *Pediatr Radiol*. 2010;40:1288–92.
- 4 Coulson WF. Peritoneal gliomatosis from a gastric teratoma. *Am J Clin Pathol* 1990;94:87–9.
- 5 Torikai M, Tahara H, Kaji T, et al. Immature teratoma of gallbladder associated with gliomatosis peritonei, a case report. *J Pediatr Surg* 2007;42:E25–7.
- 6 Lobotesis K, U-King-Im JM, Cross JJ, et al. Gliomatosis peritonei associated with a ventriculo-peritoneal shunt. *Clin Radiol* 2009;64:95–9.
- 7 Nogales FF, Preda O, Dulcey I. Gliomatosis peritonei as a natural experiment in tissue differentiation. *Int J Dev Biol* 2012;56:969–74.
- 8 Ferguson A, Katabuchi H, Ronnett B, et al. Glial implants in gliomatosis peritonei arise from normal tissue, not from the associated teratoma. *Am J Pathol* 2001;159:51–5.

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