CASE REPORT

Novel therapeutic use of Versajet for intestinal mucormycosis

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SUMMARY

We describe the case of a 17-year-old boy who developed intestinal mucormycosis from *Rhizopus oryzae* (order Mucorales) following chemotherapy for the management of acute myeloid leukaemia. He underwent a hemicolectomy and further surgery utilising the pressure washing of Versajet to debride colonised fungal collections from the psoas muscle limiting the amount of surgical debridement needed.

BACKGROUND

Intestinal mucormycosis is a rare, often fatal opportunistic fungal infection of the immunosuppressed paediatric oncology patient.¹ It usually presents with abdominal pain as the primary symptom. Management in most cases is a combination of surgery and antifungal therapy.²⁻³ In this case we describe the novel use of a readily available surgical tool with a positive outcome.

CASE PRESENTATION

We present the case of a 17-year-old male inpatient who developed severe right-sided abdominal pain following management for acute myeloid leukaemia (AML). He had been previously fit and well until he presented to the haematology department with a 2-month history of general malaise and weight loss (presentation haematology—haemoglobin (Hb) 9.0, white cell count (WCC) 21.61, platelet (Plt) 59). He is the son of a veterinary surgeon and there were a number of animals in the household. Subsequent investigations (bone marrow aspirate) confirmed AML. He was started on initial course chemotherapy as per the AML 15 Protocol. Over the next 4 months he underwent three courses of chemotherapy. Following the third course he began to report worsening right iliac fossa (RIF) pain, associated with localised guarding. This prompted surgical review and investigation for suspected neutropaenic colitis (typhilitis). His blood tests at this time revealed a C reactive protein (CRP) of 391, Hb 6.0, WCC 0.34, neutrophil (Neut) 0.0 and Plt 16.

INVESTIGATIONS

- Prelaparotomy: CT abdomen—inflammatory mass in RIF involving the psoas muscle, adjacent caecum and ascending colon (figure 1).
- Post laparotomy: Surgical resection histology—aseptate, non-parallel fungal hyphae invasive—mucormycosis (figures 2 and 3).
- Peritoneal fluid PCR—*Rhizopus oryzae*.

Figure 1 Index CT scan showing fluid collection in the right iliac fossa with a thickened enhanced wall involving the caecum and ascending colon with iliopsoas thickening.

Figure 2 Necrosis of superficial mucosa with ulceration and pseudomembrane formation (x40 magnification).

Figure 3 Aseptate, broad fungal hyphae with non-parallel edges typical of mucor species are seen invading the vessels.

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DIFFERENTIAL DIAGNOSIS

- ▶ Appendicitis
- ▶ Typhilitis
- ▶ Mucormycosis

TREATMENT

The patient proceeded to theatre and underwent a right hemicolectomy with primary ileocolic anastomosis. Histopathology of the initial resection sample revealed numerous aseptate, non-parallel fungal hyphae and an absence of Neut consistent with the diagnosis of mucormycosis (figures 2 and 3). Ambisone was started. Owing to ongoing symptoms of abdominal pain and raised inflammatory markers (CRP 280, Hb 8.8, WCC 0.38, Neut 0.11, Plt 25) he underwent a repeat CT scan 1 week post-surgery that suggested the presence of a residual collection anterolateral to the right psoas muscle (figure 4)—as a result the patient proceeded to have a repeat laparotomy. During surgery he was noted to have a mixed pattern of colonisation and invasion of his right psoas muscle. A Versajet hydrosurgery system was used to excise non-viable, infected tissue while preserving healthy psoas muscle and nerves of the lumbar plexus. In addition, the previous ileocolic anastomosis was resected and an ileostomy fashioned, the end resection showed no histopathological evidence of fungal invasion. Further antifungals, caspofungin and pozaconazole were added into the therapy. During recovery the patient experienced some mild sensory dysfunction to his right leg attributable to some disruption of the lumbar plexus during psoas debridement. He required a further trip to theatre to clear a superficial wound collection and for the fitting of a vacuum dressing. He was re-admitted 10 months after initial surgery for closure of ileostomy and made a good recovery from this procedure.

In total the patient received the following antifungal therapy—5 weeks caspofungin, 8 weeks ambisone and 6 months pozaconazole. A total of 3 weeks was with the triple therapy.

OUTCOME AND FOLLOW-UP

In total he was an inpatient for 2 months and was discharged on the single antifungal agent pozaconazole which he continued for 6 months following closure of stoma. Two years later he remains in remission from AML. He has been discharged from surgical follow-up 12 months after stoma closure, at that last review he had no abdominal/gastrointestinal symptoms. He still experiences some sensory loss in his anterolateral right thigh.

Figure 4 CT scan 1 week of postinitial surgery showing a persisting collection in the right iliac fossa and a thickened psoas muscle.

Figure 5 The Versajet system.

DISCUSSION

This is the first report of the use of Versajet to perform surgical debridement of tissue severely affected by mucormycosis. It is an important case adding weight to existing reports of intestinal mucormycosis highlighting the severity and high morbidity and mortality of this opportunistic infection in the immunocompromised paediatric patient. We stress that in an immunocompromised haemato-oncological paediatric patient abdominal pain must always be treated with a high index of suspicion and urgent surgical opinion sought. A high mortality rate has been reported for children with intestinal mucormycosis and associated haematological malignancy.⁴ The recent European guideline for mucormycosis recommends prompt diagnosis, appropriate antifungal treatment and early surgical debridement for improved outcomes.² Prompt surgical debridement is aimed at removing all devitalised tissue to reduce the mass of infecting moulds and prevent the extension of mucormycosis to adjacent structures. This has been shown to improve survival in mucormycosis and hence forms part of the treatment guideline for mucormycosis.² The use of Versajet to perform surgical debridement, allowed

Learning points

- ▶ Intestinal mucormycosis still has a very high morbidity and mortality.
- ▶ Prompt suspicion and management of the condition can produce a good outcome but surgery is rarely avoidable. For this reason prompt surgical opinion should be sought.
- ▶ The Versajet (figure 5), or a similar, system can be used for superficial visceral debridement and removal of colonised and minimally invasive pathogens to delineate areas for further debridement, in invasive visceral abdominal pathology in addition to the usual "wounds, burns and soft tissue injuries."⁵
- ▶ By utilising the Versajet technology an alternative to the previously described mass debulking surgeries may be avoidable.³

maximum tissue preservation when compared with other forms of tissue resection. In this case it eliminated the need for en bloc resection of the psoas muscle. In our patient, the system was used in an invasive visceral abdominal pathology. It could also be argued whether antifungal therapy should be started prophylactically in all immunocompromised patients with abdominal pain.

Contributors WC and DM prepared the initial draft of the manuscript. All authors have helped revise the report and agreed on the final version of the submitted manuscript.

Competing interests None.

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