Post-operative Abdominal Wall Mucormycosis—a Case Series

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Abstract Mucormycosis is caused by saprophytic fungi which cause acute invasive zygomycosis. It clinically presents with necrosis, and on histopathology, acute and chronic infiltrates are seen. It rarely infects a healthy host, but is devastating in an immunocompromised host. We studied five cases with post-operative abdominal wall mucormycosis, three females and two males. Three patients were post-operative while the other two had mucormycosis following trauma and infection was found in sutured wound. All were initially diagnosed as cases of necrotizing fasciitis. Two patients eventually survived after intensive medical therapy and extensive debridements.

Keywords Mucormycosis · Abdominal wall · Fungus

Introduction

This case series documents five patients with abdominal wall invasive mucormycosis; the nature and aggressiveness of the disease result in high mortality despite aggressive

therapy. Mucormycosis is a devastating disease most commonly seen in immunosuppressed individuals. It has the propensity to disseminate in humans and cause rhinocerebral, pulmonary, gastrointestinal, and cutaneous infections [1, 2]. It causes acute invasive zygomycosis that causes necrosis with acute and chronic infiltrates as the main feature [3]. It has predilection to invade the vessels of arterial system causing embolisation and subsequent necrosis. It rarely infects healthy host. Infection is by invasion of traumatic or surgical wounds by the fungi [4, 5].

Commonly fungi may enter through contaminated surgical instruments, sutures, or dressing materials [6, 7]. Increased incidence is seen in immunocompromised subjects who have altered immune system. As agents of mucormycosis are ubiquitous in the environment, cultures isolated from nontypical sites may be dismissed as contaminants with a subsequent delay in treatment and increased mortality.

Case History

Of the five patients studied, there were three females and two males. The age ranged between 25 and 42 years. Three patients were post-operative while the other two were following trauma and having wound that required to be sutured (roadside accident). All the patients were diagnosed as having spreading bacterial necrotizing fasciitis. All the patients were extremely sick and required intensive medical support. Subsequently, the smears of these patients had grown mucormycosis on fungal culture. It was only after checking renal function which was within normal limits that amphotericin B therapy was started at 50 mg/kg/day. Amphotericin B and liposomal amphotericin were infused in four and one patients, respectively. Multiple extensive debridements were undertaken in all the patients. Spectrum of surgical interventions ranged from repeated debridements, which

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eventually resulted in removal of large portions of anterior abdominal wall to multiple rib resections and parietal pleurectomy resulting in an open sucking wound over the chest wall. The wounds were subsequently covered with flaps/grafting. Diabetic status, viral markers (HIV, HBsAg and HCV), liver function tests, history of any drugs that cause immunocompromised were taken from all patients to check for any immune-compromised status.

Case Series

Case 1

A 27-year-old female underwent an open cholecystectomy for symptomatic gallstone disease. After 2 weeks, she developed spreading cellulitis over the abdomen, which was debrided, but the cellulitis spread. She was referred to our institution with pyrexia, toxemia and dehydration. There was a $20 \times 25 \times 7$ -cm wound with necrotic floor and spreading cellulitis. Clinical diagnosis of post-operative bacterial necrotising fasciitis was made. Extensive debridement with wide excision of necrotic abdominal wall was done, excised tissue was submitted for histopathology and culture sensitivity and fungal culture were done. She was put on antibiotics cefoperazone, sulbactam and metronidazole. Subsequently, fungal culture showed a septate fungal profile of mucormycosis. She was put on amphotericin B 50 mg/day for 8 weeks, after checking her renal function profile which was within normal range. Repeated debridements were done which eventually resulted in removal of most of anterior abdominal wall. The cellulitis spreads onto the chest wall; multiple rib resection and parietal pleurectomy were done on the right side, resulting in an open sucking wound over the chest wall. She was put on ventilatory support in the intensive care unit. Disease was brought under control after 4 weeks of antifungal treatment. Healthy granulation tissue appeared after 6 weeks. Chest reconstruction was done with ipsilateral pectoralis major flap and the rest of the raw area was grafted. Patient has recovered and was discharged after 10 weeks. She is fine and is followed up in outpatient department (Figs. 1 and 2).

Case 2

A diabetic male, aged 50 years, presented with a lump in right iliac fossa. He was operated for open right ureterolithotomy 2 months back. The patient had a sinus over the lower part of scar which was not healing. He was explored for sinus in emergency and had a 5×8 -cm hard mass extending from anterior abdominal wall till peritoneum. Excision biopsy was done which revealed it to be a lump of mucormycosis. Amphotericin B was started at a standard dose as the patient had normal renal function. Subsequently, the patient had to

Fig. 1 Post-operative day 1 of abdominal wall mucormycosis debridement

be debrided three times extensively after which only clear margins were obtained. He has improved and was finally discharged in a healthy condition. Grafting was done after 2 weeks to cover the abdominal wound on follow-up.

Case 3

A 41-year-old diabetic male with an infected, previously sutured wound on the anterior abdominal wall following a roadside accident was presented after 2 weeks of the incident. He was presented to us in a sick condition. Debridement was done of which the smear sent for culture turned out to be positive for mucormycosis. Amphotericin was started in a standard dose after checking the renal function. Cellulitis did not abate and the patient kept on deteriorating. Repeated debridements were done but to no avail. The patient was transferred to the intensive care unit where he

Fig. 2 Post-operative day 16 of the above abdominal wall mucormycosis debridement

has deteriorated, was intubated and expired after 15 days of hospital stay.

Case 4

A 32-year-old diabetic female underwent incision and drainage for an abscess on the anterior abdominal wall. She did not improve and the cellulitis kept on spreading. She was referred to our institution in a sick condition after about 2 weeks. Culture sensitivity of the discharge showed it to be *Acinetobacter baumannii* (++) and *Escherichia coli*. *A. baumannii* is sensitive to amikacin, polymyxin B, tigecycline and imipenem. *E. coli*, an ESBL producer, is sensitive to amikacin, tigecycline, polymyxin B and imipenem. The patient was started on imipenem 500 mg six hourly. We did a debridement suspecting severe necrotising fasciitis. Smears on the wound after repeated debridement showed mucormycosis. Amphotericin was started at a standard dose after checking the renal functions. The patient has deteriorated and was transferred to the intensive care unit, where she was put on ventilator due to gross septicæmia. Extensive necrosectomies and debridements were done which included a scapulectomy. Some improvement was noted during which the patient was extubated. But she deteriorated further which resulted in repeat intubation and subsequent expiry of the patient. Total stay of the patient came to be around one and a half months (Fig. 3).

Case 5

A 35-year-old diabetic female patient, after roadside accident, had a wound over the anterior abdominal wall that was sutured. Wound became infected which was debrided and on fungal culture was diagnosed as mucormycosis outside our hospital about 10 days following the accident. Patient was referred to our institution with extensive necrosis of the

Fig. 3 The above photograph is showing the patient with mucormycosis after multiple debridements showing involved scapula

anterior abdominal wall with surrounding cellulitis. Amphotericin was started at a standard dose. Extensive but ineffective multiple debridements were done. The patient was in the intensive care unit throughout his hospital stay, but his condition kept on deteriorating and finally he expired (Fig. 4).

Results

Of the total of five patients, two survived the fungal infection and are on regular follow-up.

Discussion

Although mucormycosis is most commonly seen in immunosuppressed individuals, no underlying predisposing condition is discovered in 19 % of cases. Of that population, 9 % have gastrointestinal manifestations of the disease. Over the past several years, an increase in incidence of mucormycosis has been noted, especially in cancer centres.

Mucormycosis was described in 1885 by Paltauf. It is also called as zygomycosis or phycomysis. It is caused by saprophytic fungi—*Mucorales*—which are broad non-septate hyphae. Agents of mucormycosis are pathologically defined by broad, empty, thin-walled aseptate hyphae with irregular branching (Figs. 5 and 6) [8].

From a microbiologic standpoint, *Rhizopus* species and specifically *Rhizopus oryzae* are most commonly recovered. *Rhizopus microsporus*, encountered less frequently, has been linked to hospital outbreaks from the use of contaminated wooden tongue depressors and wooden applicator devices. The sites of disease in these outbreaks were gastrointestinal and cutaneous, respectively [9, 10].

As the disease is very aggressive, so should be the treatment. Early diagnosis is the cornerstone of the treatment.

Fig. 4 After extensive debridement

Fig. 5 *Rhizopus*

Suspicious-looking areas and wounds should be smeared/cultured for organisms/sensitivity. Fungal cultures should never be taken lightly. Those who were positive should be treated aggressively with antifungals and antibiotics to prevent super-infections in involved regions.

Correction of predisposing factors is mandatory. Glycemic control is essential.

The mainstay of medical treatment in mucormycosis is amphotericin B—adult i.v. dose is 1–1.5 mg/kg/day for

Fig. 6 *Rhizopus*

2–4 weeks with close monitoring of renal functions being essential as amphotericin B is a highly nephrotoxic drug. Liposomal amphotericin B is the antifungal of choice when renal toxicity develops or conventional therapy is failing.

Surgical care involves multiple aggressive debridements; skin, gut, viscera and bone are not to be considered barriers or limitation for debridement. If the patient starts improving with resolution of mucormycosis, do consider reconstructive surgery.

Conclusion

Abdominal wall mucormycosis is a rare disease which is easily misdiagnosed as bacterial necrotizing fasciitis, which is a highly fatal mistake. Directed therapy in mucormycosis should be initiated immediately. It requires a high index of suspicion and prompt histopathologic conformation for diagnosis. We have reported five abdominal mucormycosis cases here, out of which two survived but only after extensive debridements coupled with aggressive and intensive medical therapy. The prognosis of this opportunistic infection with low incidence is very poor if early treatment is not given.

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