CASE REPORT

Aeromonas hydrophila induced necrotizing fasciitis following laparoscopic cholecystectomy

Taimoor Khalid Janjua, Saba Siddique, Mohammad Faisal Ibrahim, Muhammad Nadeem Khurshaidi

Abstract

Necrotizing fasciitis [NF] is a multifaceted disease of the muscle fascia and body tissues which demands the earliest intervention. Past reviews have documented very few cases of Aeromonas Hydrophila [AH] induced NF following abdominal surgery. AH can cause fatal NF as seen in a 72 year old female patient reported at Liaquat National Hospital &Medical College; a tertiary care center in Karachi, Pakistan on 2nd April, 2022. She had a known comorbidity of hypertension and presented with the chief complaint of symptomatic gallstones for which she underwent Laparoscopic Cholecystectomy (LAPCHOL). She developed NF of the lower abdomen post-operatively. Following uneventful Laparoscopic Cholecystectomy our patient presented to the ER two days later with severe lower abdominal pain and overlying cellulitis. Fasciotomy revealed extensive myonecrosis with necrotizing soft tissue infection. Despite undergoing extensive surgical debridement and broad spectrum antibiotic administration; the patient died in the ICU on the fifth post-operative day following septic complications. Histopathological analysis, confirmed inflammation and necrosis. Culture sensitivity of the debrided tissue revealed AH. Approach should lie towards analyzing the behaviour of such microbes in high risk patients through collective case studies. This is the first clinical case showcasing such parameters encountered in the General Surgery Department.

Keywords: Necrotizing Fasciitis, Aeromonas Hydrophila, Laparoscopic Cholecystectomy, Myonecrosis.

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Introduction

Necrotizing fasciitis [NF] is a multifaceted disease of the muscle fascia and body tissues which demands the earliest intervention i.e. both surgical and non-surgical. Among the common microorganisms causing post-surgical necrotizing fasciitis, those from Gram positive family include *Enterococcus species, Streptococcus species* and *Staphylococcus Aureus* while Gram Negative microorganisms include *Escherichia Coli (E. coli), Kleibsiella Pneumoniae, Aeromonas species (spp),* and *Vibrio Vulnificus*. Despite isolating NF causes and it's general managing and implementing less- invasive surgical technique; the mortality rates of NF have not shown any significant tendency to decrease over the last century.[1] NF is usually fatal in advanced stages where surgical debridement remains the mainstay of treatment, alongside the broad spectrum antibiotic therapy. Excluding a poorly contained aseptic operating environment, the other risk factors include old age comorbidities like Diabetes Mellitus (DM), pre-existing Hepatobiliary pathologies and immunosuppressive states.

Past reviews have documented very few NF cases traditionally associated with abdominal surgery complicated by polymicrobial or monomicrobial infections.[2] Additionally, lesser number of cases documented Aeromonas Hydrophila [AH] induced NF following abdominal surgery.[3]

Aeromonas Hydrophila is a heterotrophic Gram negative rod and facultative anaerobe which usually inhabits fresh, brackish or marine waters. The initial symptoms[4] include watery stools, abdominal cramps, mild fever and vomiting. These evolve into a myriad of acute conditions as severe gastrointestinal infection, bacteraemia and cellulitis eventually leading to necrotizing fasciitis. Aeromonas Hydrophila inspite of following an indolent course, can behave insidiously by causing fatal NF.

The case of a 72 year old female patient who developed NF, confirmed by muscle tissue biopsy, after Laparoscopic Cholecystectomy, is presented.

Case Presentation

A 72 year old female with a known history of Hypertension was admitted for elective LAPCHOL on 2nd April 2022 at Liaquat National Hospital & Medical College which is a tertiary care center in Karachi, Pakistan. She had no known drug allergies or pre-existing hypersensitivities. Her past surgical history was significant for a recent Endoscopic

Department of General Surgery, Liaquat National Hospital and Medical College, Karachi, Pakistan.

Correspondence: Taimoor Khalid Janjua. e-mail: tmrjanjua@yahoo.com

ORCID ID. 0000-0003-4357-930X

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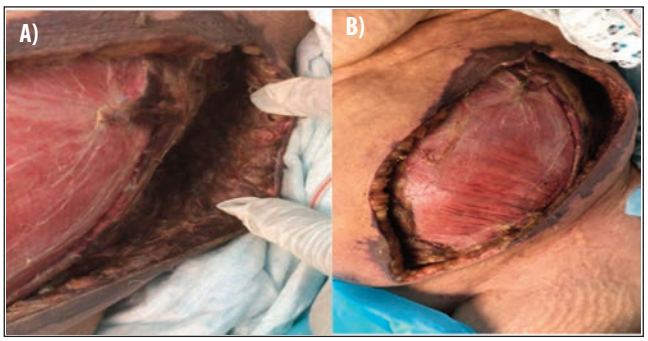

Figure: A and B depicting post-surgical widespread debridement of skin, deep fascia and EOM tissue.

Retrograde Cholangio Pancreatography (ERCP) 2 months back and two Spontaneous Vaginal deliveries (SVD). For the last month, she also had a history of intensive care unit (ICU) admission for 5 days after undergoing ERCP for Choledocholithiasis and Intubation-Induced Pneumothorax. Ultrasound abdomen confirmed Cholelithiasis and since the patient had symptomatic stones, she was prepared through routine baseline workup along with obtaining a high risk fitness from the anaesthesiology department. Cefazolin 1Gm I/V was administered to her pre-operatively after which, she underwent an uneventful procedure and was later shifted to the ward for post-operative monitoring and care. With healthy wound dressing she was discharged home on oral analgesics, Proton Pump Inhibitors (PPI's) and Oral Antibiotic (Cefixime 400mg OD for 5 days).

The patient presented to the ER 2 days later with the complaints of severe abdominal pain and erythematous rash mostly concentrated over the left lower abdomen. After not responding to Intravenous [I/V] analgesics and fluids, she underwent exploratory laparotomy on 4th April 2022. Initial diagnostic laparoscopy revealed normal peritoneal cavity with no collection, however wound exploration over the left iliac fossa revealed extensive myonecrosis extending from the External oblique muscle (EOM) to deep and superficial fascia with overlying skin cellulitis whereas, the internal oblique muscle was healthy. Surgical debridement was immediately done by excising the skin, superficial fascia, deep fascia and EOM. Excised muscle tissue was sent for culture analysis and sensitivity profile. Following surgical debridement, she was immediately shifted to the Intensive Care Unit (ICU) on high flow Oxygen and inotropic support along with continuous Intravenous [I/V] broad spectrum antibiotics. After shifting the patient to ICU, daily dressing was done using EUSOL. The wound was washed thoroughly with normal saline post-operatively. Remnants of NF with poor healing were seen even on the first post-op day (Fig: A and B) Her inflammatory markers along with all baseline work-ups revealed raised values in concordance with a pro inflammatory state.

All relevant and routine samples were sent for culture/sensitivity (C/S). Her initial blood C/S remained negative. On 2nd Post-operative day her tissue C/S indicated a Gram negative inoculation initially, which was subsequently revealed as Aeromonas Hydrophila (AH). On the 3rd Post-operative day repeat Blood Culture were sent from bilateral peripheral lines. The left peripheral line sample revealed Gram positive inoculation subsequently finalized as Vancomycin resistant Enterococcus (VRE). AH was pan-sensitive therefore antibiotics were adjusted based on the VRE spectrum. I/V Vancomycin 1gm 48-hourly and I/V Meropenem 500 mg 12-hourly were continued for 6 days. I/V Colomycin 1.5 million international units [MIU] was added on second day of hospitalization and continued 12 hourly till fifth day of hospitalization.

The patient went into septic shock with deteriorating Vital signs and died despite resuscitation measures following cardiopulmonary arrest on the fifth post-operative day.

Final histopathological analysis of debrided muscle tissue revealed dense acute and chronic inflammation with necrosis.

Discussion

NSTIs are a very challenging battleground for both physicians and surgeons. It can be divided into 2 types[5] on the basis of causative microorganisms i.e. Polymicrobial or mixed [Type 1] and monomicrobial [Type 2]. In our case NF originated as Type 2 due to an insidious NSTI onset from a monomicrobe commonly infesting marine or aquatic environments i.e. AH and later on becoming complicated with VRE.

An Iranian study[2] through a brief literature review tabulated similar cases from 1996-2006 of NF following abdominal surgeries including LAPCHOL but none of those mentioned AH as, a responsible microbe for Necrotizing soft tissue infection (NSTI). A thorough literature search across PubMed/ Medline bases and Google scholar revealed a very similar but a non-indexed case i.e. AH induced NF post-LAPCHOL from China.[3] In this case, a patient died within 24 hours despite aggressive antibiotic administration and surgical debridement of necrotic tissue.

A multi centered Japanese study[6] reviewed isolates and their microbial susceptibility for various organisms amongst post-surgical patients. It was found that AH had the lowest prevalence amongst all isolates despite causing the highest mortality. An interesting finding was the positivity of AH amongst Bile isolates sent for cultures/sensitivity, which should be recommended for all

patients undergoing LAPCHOL and similar Hepato-biliary procedures including patients having associated risk factors.

The reported patient's muscle tissue sensitivity interestingly had a Pan sensitive profile to various antibiotics tested. An 18 year retrospective analysis[7] identified initially ineffective empirical antimicrobial coverage as an independent mortality predictor for AH associated NF, however, the study mostly investigated NF of lower extremities. It would be thus imperative deliberating an experimental initiation of broad spectrum therapy for extended duration while discharging similar patients at higher risks for developing NSTI.

Trocar and port site related NSTI albeit unusual possibilities cannot be completely excluded in the reported case. The bulk of NF was situated in the left lower abdominal tissues despite healthy right sided and umbilical port sites with normal diagnostic laparoscopy after presentation. The probable causes for this atypical left sided pathology would firstly include possible seeding of infection from the closest trocar/umbilical port site and secondly the patient obtaining an iatrogenic superficial traumatic or contagious wound during initial inter departmental shifts involving multiple clothing changes between the OT and Ward stays. However it is impossible to establish any of these causes as a plausible source of infection or contamination at this stage of the clinical case.

Additional studies support the aggressive behaviour of AH as, a monomicrobe having higher mortality than other microbes such as, Kleibsiella Pneumoniae[8] and Vibrio Vulnificus.[9] The reported patient later developed VRE possibly from septic complications which further complicated her prognosis. Despite, normal pre-operative baseline laboratory workup; it is imperatively reiterating from the above presented clinical case that the patient previously required ICU hospitalization following an ERCP. Typical risk factors including rivers, lakes or marine environment exposure and non-sterile pre and post-surgical care were excluded in this case. Broad multi centered trials to evaluate and enumerate the proportions of various isolates form Gall bladder tissues and Post-LAPCHOL Bile fluids are highly recommended for obtaining a better picture and prevalence of microbes which have the potential to cause post- surgical NF.

Conclusion

The reported case in addition to highlighting the rare incidence of developing post-laparoscopic surgical NF, also underscores the challenges posed by complications caused by rarer monomicrobial inoculates like AH species. Despite all surgical and medical measures, treatment options fail in the face of aggressive NF complicated by pre-existing risk factors and monomicrobial infection. Possible approaches should be towards early diagnosis. Sampling of bile isolates from high risk patients in conjunction with estimating mortality risks through quick mortality assessing scoring criterion should be recommended. However, patients should be discharged on broad spectrum antibiotics.

Consent for publication of the case was obtained from the patient at the time of admission.

Limitations: Isolating root cause of a less likely but possible contamination through water supply source was beyond the scope of this study. As per protocol, bilateral dual samples of peripheral lines are drawn from patients in surgical ICU who required sample drawing for Blood C/S analysis.

All relevant queries described above were forwarded to Quality and Assurance Department of the Hospital.

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Author Contribution:

TKJ: Designed and drafted the initial manuscript s

SS: Reviewed the patient file, helped draft the case presentation, collected and extracted final relevant data.

MFI: Drafting, case presentation and discussion.

MNK: Critical review and final revision of the manuscript.