Successful Management of Rhabdomyolysis with Acute Infection Resulting from Chronic Sacrococcygeal Pressure Ulcers in a Paraplegic Patient: A Case Report

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Case report

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Abstract

**Background:** Rhabdomyolysis, a potentially life-threatening syndrome, is caused by the breakdown of skeletal muscle cells and leakage of intramyocellular contents into the bloodstream. The treatment of cases with rhabdomyolysis resulting from chronic sacrococcygeal pressure ulcers have been rarely reported.

**Case presentation:** A 62-year-old man suffered from high fever and dark-colored urine. For the past 30 years, the patient has lived with paraplegia, which led to his immobility. According to his physical examination, the wound on his sacrococcygeal region was dehisced and exuded repeatedly with loss of skin sensation. Upon corroboration of a physical examination and laboratory tests, the patient was diagnosed with rhabdomyolysis with an acute infection resulting from sacrococcygeal pressure ulcers. We first debrided the necrotic tissue, and then the chronic ulcer was repaired. The wound dressing was changed frequently, and antimicrobial therapy and nutritional support were included in the treatment. The fever and dark-colored urine were gradually relieved post-operatively. Renal function was also improved according to the typical indicators in laboratory tests. Additionally, the size of the pressure ulcers was reduced, to some extent. The patient was discharged after one month of hospitalization.

**Conclusions:** Accurate diagnosis is critical for clinicians to administer precise treatment to paraplegic patients with progressive rhabdomyolysis.

## Background

Rhabdomyolysis, a critical condition characterized by destruction of the membrane integrity of skeletal cells, is caused by a series of factors affecting the membrane, membrane channel, and energy supply of muscle cells. Consequently, intramyocellular components, such as myoglobin, creatine kinase, and small molecules, are released into blood circulation [1]. As a consequence, patients typically present with muscle pain, muscle weakness, and darkened urine, which are often accompanied with acute renal failure, metabolic disorders, or even disseminated intravascular coagulation (DIC) [2]. The factors that can trigger rhabdomyolysis include excessive exercise, high-voltage electric shock, generalized spasms, poisonous insect bites, burn injuries, crush injuries, gene variants [3], and adverse drug reactions [4]. Although rhabdomyolysis is a well-known complication, an internationally accepted definition is still missing, leading to great uncertainty in clinical practice. Herein, we report a case of rhabdomyolysis and myoglobinuria resulting from prolonged, unrelieved pressure in a paralyzed patient. The purpose of the present research was to provide insights, treatment ideas, and clinical evidence for further studies involving rhabdomyolysis.

## Case Presentation

On January 16, 2019, a 62-year-old man was transferred to the emergency department of our hospital due to a high fever of 39.0 °C and dark urine. The patient's medical history showed that he suffered from a
lumbar vertebrae injury approximately 30 years before his admission to our hospital. Even though underwent surgery immediately, he remained paralyzed. Additionally, 10 years before his admission to our hospital, sacrococcygeal bedsores emerged and he underwent debridement and muscle flap stuffing of the wound at Hangzhou Hospital of Traditional Chinese Medicine (Hangzhou, China). Furthermore, three months before his admission to our hospital, the patient’s condition worsened because the wound on the sacrococcygeal region was dehisced and exuded repeatedly. Therefore, the patient was admitted to our department in the horizontal position. A physical examination showed that the size of the infected wound was about 2 cm × 4 cm, and the depth was to the surface of sacrum (Fig. 1A). The amyotrophy of the two lower limbs was obvious, with the disappearance of a cutaneous expression of sensation. Other examinations were unremarkable, except for the absence of a physiological reaction and pathological character on both lower extremities. Table 1 shows the laboratory results of the patient after admission to our hospital. Moreover, the CK level was significantly elevated. In terms of a complex and critical condition, we decided to perform debridement on this patient the day after consultation and with a multidisciplinary team. Intraoperative exploration revealed that the distal wound was not connected with the proximal wound, and there was no obvious necrotic tissue in the wound. Thus, the distal wound was debrided and sutured (Fig. 1B, C). We then removed the pus and necrotic muscle within the proximal wound, which was a large cavity under necrotic slough. Fresh granulation could be observed after complete debridement (Fig. 1D). Frequent dressing change, antimicrobial therapy, correction of electrolyte imbalance and acidosis, and nutritional support were continued as well. Furthermore, three days after the surgery, the suture area was dry and clean without obvious swelling and exudation (Fig. 1E). Dark-colored urine was gradually relieved the day after the surgery and resolved at day 5. The temperature of the patient showed that the fever was relieved at day 3 (Fig. 2A). The patient’s CK level peaked on the first day, gradually decreased post-operatively, and then returned to normal at day 9 (Fig. 2B). The white blood cell (WBC) count and the C-reactive protein (CRP) concentration were reduced and restored to normal at days 7 and 11, respectively (Fig. 2C, D). The patient was finally discharged after one month of hospitalization. Three months after the surgery, the wound healed well, and there was no sign of infection (Fig. 1F).
Table 1
LABORATORY DATA

<table>
<thead>
<tr>
<th>Items</th>
<th>Results</th>
<th>Units</th>
<th>Ref. Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Routine blood test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White blood cell (WBC)</td>
<td>18.5</td>
<td>10^9/L</td>
<td>3.5–9.5</td>
</tr>
<tr>
<td>Neutrophil</td>
<td>94.8</td>
<td>%</td>
<td>40.0–75.0</td>
</tr>
<tr>
<td>Lymphocyte</td>
<td>2.8</td>
<td>%</td>
<td>20.0–50.0</td>
</tr>
<tr>
<td>Monocyte</td>
<td>2.3</td>
<td>%</td>
<td>3.0–10.0</td>
</tr>
<tr>
<td>Eosinophil</td>
<td>0.00</td>
<td>%</td>
<td>0.4–8.0</td>
</tr>
<tr>
<td><strong>Blood Biochemistry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total bilirubin (TB)</td>
<td>25.9</td>
<td>µmol/L</td>
<td>3.0–25.0</td>
</tr>
<tr>
<td>Direct bilirubin (DB)</td>
<td>14.5</td>
<td>µmol/L</td>
<td>0.0–7.5</td>
</tr>
<tr>
<td>Indirect bilirubin (IB)</td>
<td>11.4</td>
<td>µmol/L</td>
<td>1.7–19.0</td>
</tr>
<tr>
<td>Glucose</td>
<td>253</td>
<td>mg/dL</td>
<td>3.0–25.0</td>
</tr>
<tr>
<td>Urea</td>
<td>13.2</td>
<td>mmol/L</td>
<td>2.5–8.2</td>
</tr>
<tr>
<td>Creatinine</td>
<td>215</td>
<td>µmol/L</td>
<td>40.0–115.0</td>
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<tr>
<td>Potassium</td>
<td>3.81</td>
<td>mmol/L</td>
<td>3.50–5.30</td>
</tr>
<tr>
<td>Sodium</td>
<td>134.3</td>
<td>mmol/L</td>
<td>137.0–147.0</td>
</tr>
<tr>
<td>Chloride</td>
<td>96.6</td>
<td>mmol/L</td>
<td>99.0–110.0</td>
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<tr>
<td>Creatine kinase (CK)</td>
<td>10809</td>
<td>U/L</td>
<td>25.0–200.0</td>
</tr>
<tr>
<td>Creatine kinase isoenzyme (CK-MB)</td>
<td>105</td>
<td>U/L</td>
<td>2.0–25.0</td>
</tr>
<tr>
<td>Hydroxybutyrate dehydrogenase (HBDH)</td>
<td>213</td>
<td>U/L</td>
<td>52.0–182.0</td>
</tr>
<tr>
<td>Lactate dehydrogenase (LDH)</td>
<td>427</td>
<td>U/L</td>
<td>90–240</td>
</tr>
<tr>
<td>C-reactive protein (CRP)</td>
<td>408.36</td>
<td>mg/L</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

Rhabdomyolysis, a complicated syndrome with serious potential complications, is associated with acquired or inherited causes [5]. In the present case, rhabdomyolysis was caused by chronic pressure ulcers in a paraplegic patient. Pressure ulcers, also termed pressure sores, bedsores, decubitus ulcers or pressure injuries, are injuries of the skin and its underlying appendages and soft tissues, from constant or prolonged pressure exerted on an unspecified part of the trunk, limb, or body region. These lesions mostly
occur in people who suffer from certain conditions, such as coma, drug overdose, surgery, paralysis, and spinal cord injury [6, 7], which may lead to decreased mobility and difficulty in postural movement [8]. Therefore, as a serious complication of various chronic diseases, pressure ulcers may result in more severe problems. Common manifestations of rhabdomyolysis include muscle pain, tenderness, swelling, and weakness, combined with fever, general weakness, increased white blood cells and/or neutrophils, and abnormalities in urine appearance. Statistically, about 13–50% of patients may develop acute renal failure (ARF) [9], leading to oliguria, anuria, or azotemia. However, the accurate incidence rate of rhabdomyolysis is difficult for clinicians to determine, especially in the ED [10], because prospective studies assessing the morbidity of rhabdomyolysis are quite rare. Thus, a limited number of cases in the early stages of rhabdomyolysis are diagnosed in the clinic. Although numerous researchers study rhabdomyolysis, only a few cases regarding the treatment of patients suffering from rhabdomyolysis from pressure ulcers have been reported. It was previously reported that a case of rhabdomyolysis caused by acute pressure sores, in which the patient died in the end[11].

In the present research, before admission of the patient to our hospital, he was sent to the emergency department of a local hospital and had no certain diagnosis. However, this patient had sacrococcygeal pressure ulcers for over 10 years, and the wounds from some ulcers were ruptured for over 3 months. It should be noted that not only the family members of the patient, but also the clinicians of local hospitals had no awareness of the risks in the care of long-term bedridden patients. Importantly, with respect to prevention of the further complications, the vigilance of patients with paraplegia and their family members should be enhanced in regard to identification and treatment of pressure ulcers [12]. As a severe complication of pressure ulcers, rhabdomyolysis needs to be prevented or better identified during the early stages. Thus, education, awareness, and specific training are effective measures in the daily care of those patients.

However, the treatment of rhabdomyolysis is strictly based on accurate diagnosis. Aside from the fever, dark-colored urine, and metabolic disturbance of the patient, a sensitive indicator of rhabdomyolysis was the CK level, which was up to 10809 U/L. The higher the CK level, the more severe the muscle damage and the higher the risk of acute kidney injury. Due to the critical condition and multidisciplinary problems of this case of rhabdomyolysis with acute infection, we organized a multidisciplinary diagnosis and treatment (MDT) model, which was implemented by the Orthopedics Department with input from the Nephrology Department, Infection Department, and Intensive Care Unit (ICU). A number of physicians demonstrated that the patient had severe renal dysfunction and acute infections, and they suggested improving renal function and controlling the infection pre-operatively. However, other physicians believed the necrotic muscle tissues in the sacrococcygeal bedsores were the primary and exact cause of other manifestations, and debridement should be performed immediately in order to prevent fatal consequences, such as renal failure and sepsis. We eventually adopted the latter opinion and performed debridement immediately. It was disclosed that all symptoms and laboratory data were gradually relieved postoperatively. To our knowledge, anesthetics mainly cause damage to renal function. In the present case, the patient suffered from paraplegia, leading to the loss of skin sensation around the operative
region. Thus, it was unnecessary to conduct an emergency operation with anesthesia, which could prevent further damage and reduce the risk of acute kidney injury.

**Conclusion**

In conclusion, we reported on a paraplegic patient who suffered from rhabdomyolysis and infection because of chronic sacrococcygeal pressure ulcers. We reported on this patient case in order to aid physicians in the diagnosis of rhabdomyolysis caused by chronic pressure ulcers.

**Abbreviations**

CK: Creatine kinase; DIC: disseminated intravascular coagulation; WBC: white blood cell; CRP: C-reactive protein; TB: Total bilirubin; DB: Direct bilirubin; IB: Indirect bilirubin; CK-MB: Creatine kinase isoenzyme; HBDH: Hydroxybutyrate dehydrogenase; LDH: Lactate dehydrogenase; ARF: acute renal failure; MDT: multidisciplinary diagnosis and treatment; ICU: intensive care unit

**Declarations**

**Authors' contributions**

HK and YSZ took care of patient in the Orthopedics department and wrote and revised the paper. Both authors have read and approved the manuscript, and have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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**Availability of data and materials**

All data generated or analyzed during this study are included in this published article.

**Ethics approval and consent to participate**
Since this is a case report, approval from the local ethical committee is not necessary.

**Consent for publication**

The patient signed consent for publication of data (including individual details and images).

**Competing interests**

All authors have no conflict of interest to disclose.

**References**

Figures

A. The preoperative view showed the size, depth and condition of the wounds among which the infected one was festered; B. C. D. The intraoperative view showed the distal wound was debbridged and stutured first, then the pus and necrotic muscle was removed in the proximal wound; E. F. The postoperative view showed the wounds were healed well after 7 days and 1 month.

Figure 1
Figure 2

Clinical course of the patient. A. The temperature level returned to normal at day 3; B. The CK level peaked at day 1 and decreased to normal at day 9; C. The WBC level was reduced gradually and back to normal at day 7; D. The CRP level decreased and returned to normal at day 11.