

Case Report

Mortality in a low energy geriatric polytrauma patient

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1. Summary

- 69 year old female patient with ground level fall.
- Suffered right displaced acetabulum and right nondisplaced distal femur fracture.
- Meanwhile, also had 2 year old nonunion of right intertrochanteric fracture with fixation in situ.
- Medically, she suffered from multiple medical problems including osteoporosis, short gut syndrome, radiotherapy for stage 1 lung cancer and malnutrition.
- Had within 2 days, orthopedic surgery for ORIF R acetabulum, R total hip arthroplasty, ORIF of R distal femur taking 6 hours of operative time.
 - Difficult postoperative course with failure to overcome the surgical insult, poor oxygenation requiring oxygen support and pulmonary embolism day 2 with minor myocardial infarct, congestive heart failure and pneumonia on day 10. She required delayed intubation and ICU admission on day 15 for hypoxic respiratory failure.
- The patient died on day 22 after palliative treatment was instituted.

2. Case study

A 69 year old independent female with a very limited walking tolerance, who usually used a cane, had a ground level fall suffering a right displaced anterior column acetabulum fracture and right nondisplaced distal femur fracture. X-rays show (Figs. 1, 2a and 2b) severe osteoporosis with comminution of her right acetabulum. She had a 2year old mildly painful nonunion of a pertrochanteric right proximal femur fracture that had a cephalomedullary device in place (Fig. 3). Her past medical history was very significant:

1. Coronary Artery Disease: Heart Attack - 2015. Stented right coronary artery
2. Stage I Lung Ca; Treatment: Radiotherapy in past
3. Dyslipidemia
4. Gastro-esophageal reflux disease

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Fig. 1. Right acetabular fracture preop.



Fig. 2. a. Oblique of Right nondisplaced distal femur fracture preop.
b. Lateral of Right nondisplaced distal femur fracture preop.

5. Severe malnourishment (Alb 1.5g/L) - Bowel resection 1980s for Ulcerative colitis. Development of chronic diarrhea. Short bowel syndrome
6. Hysterectomy at age 45
7. Severe Osteoporosis. On Vit D 5000IU and zoledronic acid
8. Vit B12 deficiency
9. Previous fractures (3 surgeries in last 5 years)
 1. Left hip – cephalomedullary nail – 5 years before
 2. Right hip – previous intertrochanteric fracture, with a mildly painful **non-union** despite revision surgery cephalomedullary nail – 2 years ago
 3. Right Tibial plateau – non-operative treatment 2 years ago (Fig. 4)



Fig. 3. Nonunion of right proximal femur fracture preop.



Fig. 4. Right 2 year old healed tibial plateau fracture and nondisplaced distal femur fracture.



Fig. 5. Right acetabular fixation and replacement postop.

She was seen preoperatively by internal medicine on Day 1 and thought to be safe for surgery. It was thought by her surgeon that it would be best to do all her surgery in one procedure to lessen the burden on her rather than do multiple possible smaller surgeries on her. On Day 2, a well-planned orthopedic procedure reduced, fixated and replaced her fractures over 6 hours (Figs. 5, 6a and 6b). But, she showed failure to thrive with inability to mobilize and continued requirements for supplemental oxygen. A pulmonary embolism occurred on day 2 with slow decline and cardiopulmonary failure and congestive failure by Day 10. Chest pain signified a nonST myocardial infarct with pneumonia treated with Lasix and antibiotics. Day 15 demonstrated a significant turning point as she could no longer breathe on her own and she was admitted to ICU for intubation for hypoxic respiratory failure. She was palliated and died on Day 22.

2.1. Determined reasons for morbidity or mortality

This patient, despite being only 69 years old, was chronologically much older. Her serum albumin was extremely low, she was malnourished and she had extremely poor bone quality. She had a long history of osteoporosis and probable short bowel syndrome

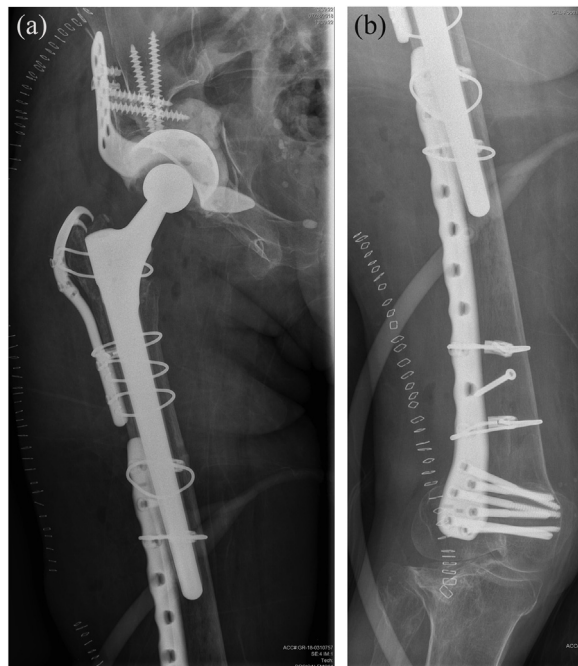


Fig. 6. a - Right proximal femur fixation and replacement postop.
b - Right distal femur fixation postop.

with very little physiologic reserve. Her preoperative albumin was 1.6g/L demonstrating very severe protein deficiency. With six hours of surgery, she could not recover. A different plan may have been to do one smaller surgery, such as an anterior acetabular reconstruction and then treated the proximal femur and the distal femur nonoperatively. This would have created less surgical burden for her. If she had thrived and been nutritionally supported, then possibly more surgery could have been done. Intubation, nourishment and ICU were not enough to assist this severely hypoalbuminemic patient in recovering from the 6 hour surgical insult. Chung et al. in 2018, reviewed over 12,000 patients with hip fractures and they determined that when the serum albumin was < 2.4g/L, the mortality rate was 17.4% [1]. Bohl et al. in 2017, reviewed over 17,000 hip fracture patients and determined that the mortality rate was > 20% when the serum albumin was less than 2.0g/L [2]. They also determined that the prevalence of hypoalbuminemia was very common at 46% in this very large group of elderly patients. Avenall et al. in 2016 in a Cochrane systematic review, published that oral multi-nutrient supplements started before or soon after surgery by venous or nasogastric feeding may prevent surgical complications in very malnourished patients [3].

2.2. Recommendations

Geriatric patients presenting with a fracture, usually need expedited medical assistance and early surgery. Nonoperative care may or may not be an option. However, hypoalbuminemia is a sign of significant malnourishment and such patients should have carefully planned surgical procedures with nutritional supplementation. Large data bases have predicted mortality in such cases and surgical procedures should be limited to smaller life and limb-saving procedures performed with medical support. A careful team approach should be utilized in these patients with geriatrics, internal medicine, anesthesia and orthopedics working in concert with a supportive team of dietetics and physiotherapy. Some patients may require many short trips to the operating room to accomplish the same result as would occur with a healthy younger polytrauma patient. Severe malnourishment may preclude all but life-saving surgery in an elderly patient presenting with geriatric polytrauma. A serum albumin of greater than 3.5g/L is the goal of medical management such that wound healing and recovery can be accomplished with a geriatric polytrauma patient.

3. Summary educational points

- 1) Geriatric polytrauma patients have a high mortality rate and need careful expedited team care
- 2) Hypoalbuminemia is a marker for poor outcome and a serum albumin of greater than 3.5g/l should be the goal
- 3) Multiple carefully planned small operations are desirable rather than large surgical insults for the geriatric polytrauma patient
- 4) Sometimes nonoperative care may be better than aggressive surgical care for medically unwell geriatric polytrauma patients

Declaration of competing interestCOI

The authors have no conflicts of interest.

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