Case Report | Trauma International | 2022 July-December; 8(2): 21-25

Management of a Polytrauma Case In a Resource-Constrained Hospital

Daniel Mossalbaye Adendjingue[1], S. Pascal Chigblo[2], Oswald Goukodadja[2], Adebola Padonou[2], Iréti Fiacre Tidjani[2], Aristote Hans-Moevi Akue[2]

Abstract

Introduction: The management of polytrauma patient should be beforehand and always in keeping in mind the damage control. The surgical treatment is secondary to the stabilization of the patient.

Clinical Case: We are reporting a 34 years old polytrauma patient from a motor vehicle accident. On physical examination, we noted : a severe brain injury, a closed articular fracture of right distal radius associated to a dislocation of distal radius and ulna distal joint, a closed bilateral fracture of both trochanters, an open communitive tibial fracture of proximal epiphysis methaphysis and diaphysis. The last one was classified as type III B of Gustilo and Anderson and associated to a closed fracture of the head and the neck of right fibula, a closed fracture of the right lateral malleolus. After patient stabilization, the head injury improves to normal Glasgow score on 8th day of admission. Necrosis of soft tissus and exposition of the tibia was noted. The surgical treatment was done on 2 stages due to financial issues. A bone synthesis of the trochanteric fracture was done only on the left and external frame as well as a muscle flap was done for the right tibial fracture on the 18th day. On the 42nd day a PAPINEAU technic associated to a proximal inter tibiofibular graft was done. The functional outcome of the orthopaedic treatment of the wrist was bad (malunion). That last complication was managed by a SAUVE KAPANDJI surgery (at 6 months) and the contracture (pronation and supination) at 12 months post trauma. The outcome was fair good despite patient financial issue and local complications that compromise an optimal surgical management and a delay. He resumes normal professional activities at about 2 years. At 5 years follow up, functional and anatomical results were satisfactory.

Conclusion: In a limited resources' setting, the management of lesions including a multiple fractures is a challenge for the practitioner and the injured patient. A management taking into account social and economic resources is mandatory to minimise sequelae.

Keywords: Management, Polytrauma, Limited resources.

Introduction

The management of polytrauma patients requires good coordination between the teams and an appropriate timing of the actions to be performed. It must respect the rules of life-saving by prioritizing the survival of the patient while sequencing and prioritizing the treatment of injuries (Trauma Damage Control). Satisfactory homeostasis and emergency control of hemorrhagic injuries without wasting time for long and aggressive surgical management should be the rule [1]. Robert et al. used the term "limb damage control orthopaedics" when there is a significant soft tissue injury, prioritizing temporary stabilization [2].

We report a case of polytrauma in a patient with multiple injuries interesting head, bones and soft tissue. In our difficult socio-economic contexts and without health coverage, patients have to pay for the care out of their pockets. This often delays surgical treatment. For multiple and complex lesions, constraints sometimes oblige the practitioner and the patient to agree on which lesion is preferred for surgery rather than the other. This patient was a particular clinical case corresponding to the above context.

Case Report

This was a 34-year-old patient, right-handed, teacher, married and without health coverage who was involved in a motor vehicle traffic accident. The impact was frontal with a car coming from the opposite direction.

He suffered from an head injury with a coma and multiple closed and open fractures. The patient was driving a motorcycle and was not wearing a helmet. He was admitted about a hour at the surgical emergency room. Clinical evaluation on admission noted a stable hemodynamic status, severe brain injury (Glasgow score: 8/15) with multiple cephalic dermabrasions. His oxygen saturation in ambient air ranged from 80-90%. Elsewhere, we found a swelling and significant deformity of the right wrist without vascular involvement, a clinical closed fracture of both proximal femurs, a traumatic right knee. Also, we noted a clinical open diaphyseal fracture of both bones of the right leg classified as Gustilo and Anderson type III B (GA III B). Pelvic examination was normal. The right ankle showed discrete swelling. There was no vascular injury to the low extremity, neurological involvement could not be assessed urgently. The examination of the

[1]Department of Orthopedic-Traumatology, National Teaching Hospital CHU-RN, N'Djamena-Chad.
[2]Department of Orthopedic-Traumatology, National Teaching Hospital CNHU-HKM, Cotonou, Benin.

Address of Correspondence
Dr. Daniel Mossalbaye Adendjingue,
Department of Orthopedic-Traumatology, National Teaching Hospital CHU-RN, N'Djamena-Chad.
E-mail: dendjinguedaniel@gmail.com / adendjingue@yahoo.fr

Submitted: 21/03/2022; Reviewed: 18/04/2022; Accepted: 12/06/2022; Published: 10/10/2022

Trauma International ISSN 2455-538X | Available on www.traumainternational.co.in | DOI- https://doi.org/10.13107/ti.2022.v08i02.030

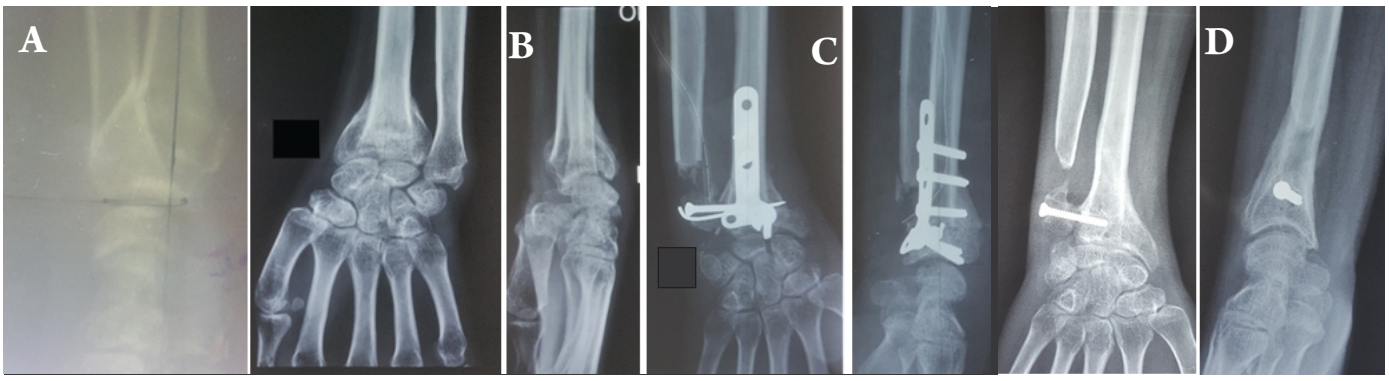

Figure 1: Closed fracture of the right distal radius + homolateral distal radioulnar dislocation:
A) Initial standard radiography; B) Malunion before surgery; C) Image after 1st Sauvé-Kapandji procedure (presence of bone bridge); D) Standard radiography after consolidation.

spine and other systems was normal.

The patient was then admitted at the Intensive Care Unit, intubated and subjected to a neuro-resuscitation protocol. Analgesics, antibiotic prophylaxis (amoxycillin/clavulanic acid + Gentamycin) and prevention of tetanus were instituted immediately. Local care of the open lesions was performed followed by temporary cast immobilization of the bone lesions. The C4 cervical collar was systematically used. The biological exploration, including blood count, ionogram, blood gas, and renal examination, was normal.

The brain scan performed after patient stabilization noted: a left frontal edema and hemorrhagic contusion, a posterior hematoma and a left frontal and maxillary fracture. The x-ray of the limbs showed (Figure1) :

- Right distal radius (joint) fracture associated to an homolateral distal radioulnar dislocation, the X-ray parameters were: radial inclinaison = 5°, volar tilt = -11°, distal radioulnar index = +8 mm ;
- Bilateral intertrochanteric fracture, proximal comminuted fracture interesting epiphysis, metaphysis and diaphysis of the right tibia, fracture of the head and neck of the right fibula and this of the homolateral lateral malleolus.

After 24 hours, the patient received an initial surgical care consisting of trimming of the open leg fracture, transcondylar traction on the left and transcalcaneal traction on the right. External maneuver reduction was performed followed by a circular cast for the right wrist. Thromboembolic prevention by anticoagulant was secondarily instituted.

The subsequent management and evolution of the lesions were as follows:

1) Cephalic injury: The brain injury evolved favorably under medical treatment with a return to normal consciousness (Glasgow score: 15/15) from the 8th day. The patient was get out of the intensive care unit on 11th day and was transferred to the Orthopaedic Trauma department. Seizure prevention with phenobarbital was instituted for 3 months. The care suites was simple and at the 5th-year follow-up, there were no neurological sequelae related to the trauma.

2) Wrist injuries (Figure 1): The distal radius fracture and the distal radioulnar dislocation were not operated on within the required time due to patient's financial problems. The evaluation at the 50th day after (when the cast was removed) showed a malunion with an ulnocarpal impingement. The distal radioulnar parameters compared to the initial measurements were invariable. The functional result was bad with a DASH score of 80/100 [3]. This motivated a surgery at 6 months post-trauma associating a "SAUVE KAPANDJI" procedure. The volar approach of Henri was used for the radius and the posteromedial approach for the ulna. After osteoclasia, reduction, and stabilization of the distal radius by a 3.5 mm plate, approximately 1 cm length extraperiosteal bone resection of the distal ulna was performed. This resection was located 1.5 cm from the ulnar styloid. We performed a thorough saline lavage of the site prior to exposure lesions and then, avivated the articular surfaces. A temporary 18/10 Kirschner wire ulno-radial was used to fix the ulna while controlling the distal radioulnar index. One screw supplemented by an ulno-radial Kirschner wire allowed to realize the distal arthrodesis. Neither the pronator quadratus nor the ulnar flexor carpi was interposed at the ulnar resection site. The postoperative X-ray parameters of the wrist were: radial inclinaison= 12°, volar tilt= 0°, distal raioulnar index= -3 mm. Functional rehabilitation began on the 10th postoperative day but was immediately poorly observed. Consolidation was achieved in 3 months with satisfactory distal radioulnar fusion. A new surgery was necessary 6 months after the first due to a stiffness in pronosupination (30°/0°). This stiffness was related to the formation of a bony bridge in the ulnar hiatus. This second surgery consisted of removal of the plate

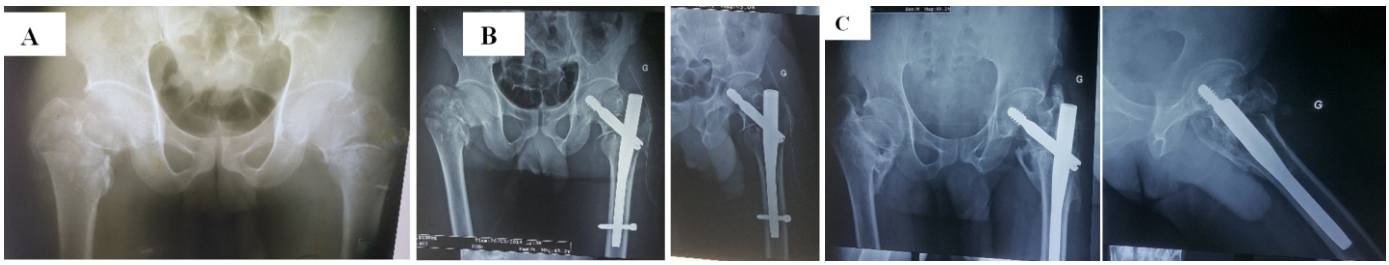

Figure 2: Bilateral pertrochanteric fracture :
A) Initial standard radiograph; B) Immediate radiographic control after left gamma nail osteosynthesis; C) Standard radiography after consolidation.

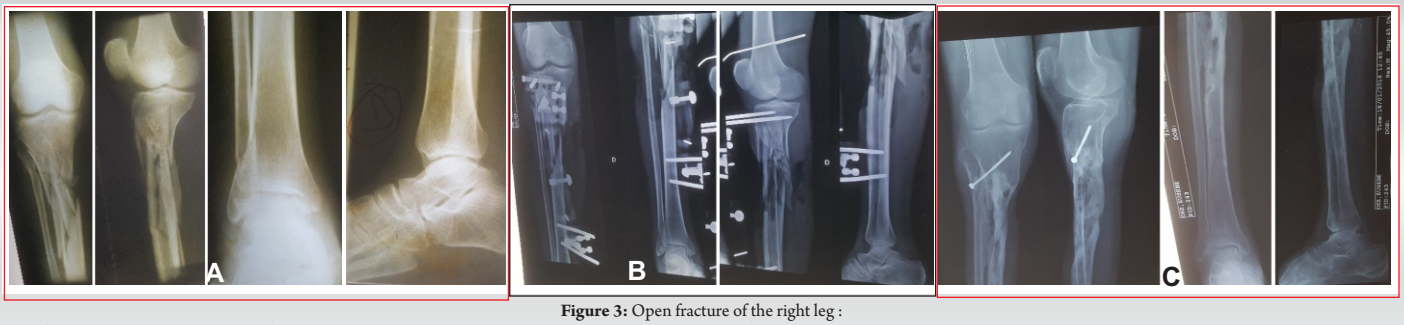

Figure 3: Open fracture of the right leg :
A) Initial standard radiography ; B) Immediate radiographic check after external fixator osteosynthesis (note presence of distal femoral traction pin; C) Standard radiography after consolidation.

and the distal radioulnar Kirschner wire, osteoclasia followed by partial interposition of the pronator quadratus and ulnar flexor carpi in the hiatus of ulna. Screw removal was not performed. An immobilization by plaster splint was made for analgesic purpose for 5 days. Progressive functional rehabilitation according to the pain threshold was started after 5 days following surgery. After 5 years, the DASH functional score was 60/100. The X-ray radioulnar parameters did not changed and the compared active joint ranges of the 2 wrists were presented in Table I.

3) Hip injuries (Figure 2): Reduction and internal fixation by gamma nail was performed at the 18th days after trauma for the left intertrochanteric fracture. The right side was not operated for financial reasons, requiring proximal tibial traction to be maintained for 50 days. Consolidation of the two fractures was obtained after 3 months. Active and passive flexion/extension were 50/0° and 90/0° respectively on the right and the left. Intermittent low back pain and moderate pain in the right hip related to walking were reported by the patient. There was not interference with daily activities.

4) Right knee, leg, and ankle injuries (Figure 3): The evolution of the open leg fracture was marked by anteromedial soft tissue necrosis in the 1/3 middle. Hypoesthesia in the fibular nerve territory was noted. After 18 days following the trauma, we performed a necrosectomy (concomitant with the left trochanteric osteosynthesis), the tibia was exposed over approximately 8 cm x 4 cm. This prompted a tibiotibial exofixation and a total soleus flap for coverage.

The postoperative evolution was marked locally by suppuration, skin necrosis and partial necrosis of the flap. This resulted in a tibial exposure of approximately 10 cm x 2 cm. Clinical examination and X-ray revealed tibial osteitis with bone necrosis. The swab culture was polymicrobial, and the probabilistic antibiotic therapy was maintained. The patient was readmitted to the operative room after 42 days following surgery for a second necrosectomy and bone resection. We noted approximately 12 cm of tibial bone loss between 1/3 proximal 1/3 middle. We then performed a posterolateral approach (about 4 cm) to the knee, exposing the lateral tibial cortical and the medial fibular cortical bone. They have been sharpened to interpose grafts followed by proximal unipolar fibulotibial screw for fixation (creating an intertibiofibular graft). An "open bone graft" (PAPINEAU technique) was performed simultaneously. The graft was taken at the homolateral iliac crest. The medial face of the fibula opposite the loss of substance was revived before interposing the graft. The external fixator, still stable, was not revised. Postoperatively, we irrigated the "open bone graft" site twice daily with saline. The duration of the irrigations was 2 to 3 hours per episode and the irrigated site was protected by 2 layers of sterile compresses between sessions. After the second irrigation of the day, a fatty dressing with honey was applied to the wound edges. This allowed a progressive incorporation of the graft into the granulation tissue.

The postoperative evolution was simple and complete coverage by progressive budding was obtained in 2.5 months. A thin skin graft performed at the 3rd month allowed for complete healing. Eight months after surgery, the bone callus was satisfactory, allowing to removal of the external fixator followed by contention with a walking cast (full support). Consolidation of the various lesions was obtained at the 12th months post-trauma and 10 months post-operative. The fractured extension of the tibial plateaus and the fracture of the lateral malleolus consolidated without defect in the absence of specific treatment. At 5 years follow-up, we noted a right lameness with a shortening of the right lower extremity of 0.75 cm compared to the opposite side. There was no axis defect but the patient complained of intermittent moderate right ankle pain related to walking. There was a decrease in right leg perimeter of 7 cm compared to the opposite side (18/25 cm), active and passive flexion of the left knee at 110° as well as active and passive extension at 0°. Stiffness of the right ankle in 90° dorsal flexion, a deficit in active extension of the toes and hypoesthesia in the superficial fibular nerve territory were also found. Resumption of professional activities was possible as early as the 24th post-trauma month.

Table I: Comparative active joint ranges of the 2 wrists.

Mouvement	Right	Left
Flexion	15°	85°
Extension	10°	85°
Abduction	5°	20°
Adduction	5°	45°
Pronosupination	90/70°	90/90°

Discussion

The management of a polytrauma patient requires prompt mobilization of the caregivers but also of the victim's relatives in a system without social security for most people. Sometimes, the least care administered depends directly on the financial capacity of the patient or his relatives. As a rule, the treatment of brain injuries (neuro resuscitation) was prioritized in our patient while performing minimal care for the other injuries. The surgery performed on a single hip and the absence of surgical treatment as soon as possible for the wrist lesion were imposed by financial constraints. The choice of the left hip took

into account the potential functional advantage of the left lower extremity being the site of a single injury. The occurrence of a postoperative infection in the leg was one of the pejorative elements that delayed the possibility of surgery for a while. The fact that the patient was right-handed and a teacher was an imperative for the most anatomical possible restitution of the wrist, but this was not obtained in our case.

Our functional wrist result was poor after the first SAUVE KAPANDJI operation (pronosupination at 30/0°). The absence of interposition of the pronator quadratus filling the ulnar hiatus would not be a sufficient reason for the formation of the bone bridge, it has been reported that such a complication occurred around an interposed silicone implant and a complete filling of the hiatus when the pronator quadratus was interposed [4]. Unlike us, most authors only interpose the pronator quadratus and advise against interposition of the ulnar flexor carpi [5, 6]. Opting for the latter technique from the outset would have been more beneficial in all aspects. Kacou et al [7] obtained consolidation in an average of 4 months in eight patients, with a minimum of 2.5 months. This is close to our result where consolidation was obtained in three months. However, the latter authors noted a higher average anatomical result than ours. This difference should be considered with reserve, as our situation is a unique case of a polytrauma patient. Functionally, our final result was considered good according to the DASH score allowing the patient to resume teaching activities. Improvement in flexion-extension was practically observed in all patients in the Baciu et al [8] study. Some authors noted a significant correlation between anatomical and functional outcome in a series of 40 patients with distal radius fractures [9, 10, 11]. In the literature, the significant gains in mobility concern pronosupination [12, 13]. One of the two major complications of the SAUVE KAPANJI technique is ossification of the pseudarthrosis zone and instability of the ulnar stump.

The treatment of open leg fractures with both bone and soft tissue loss, whether immediate or secondary, remains difficult. Others have used vacuum-assisted closure (VAC) in cases of skin necrosis, which we did not dispose, although it is an effective alternative of reconstructive surgery [14, 15]. We used an unusual solution combining the PAPINEAU technique and a proximal intertibiofibular graft on a fractured proximal fibula. This resulted in satisfactory bone fusion. In the postoperative period, the practical conditions did not allow for continuous irrigation of the graft, so it was done intermittently (followed by a greasy dressing that kept the site moist). Complete coverage of the graft and consolidation were achieved within a reasonable time (two months and ten months, respectively). Panda et al [16] noted tibial consolidation in 7 months with daily irrigation for two hours until the graft was incorporated into the granulation tissue. This was achieved by alternating saline and Dakin's solution. The author's justification for the use of Dakin's solution was the limited access to saline. In our case, the patient was able to recover an acceptable functional result allowing him to resume his professional activities.

Conclusion

The management of a polytrauma patient, especially one with a polyfracture, in a resource-limited setting remains a challenge for the practitioner but also for the patient. It is sometimes necessary to resort to unconventional protocols, but optimization of results with the available resources must always be kept in mind.

Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

Conflict of Interest: None, **Source of Support:** None

References

1. Taeger G, Ruchholtz S, Waydhas C, Lewan U, Schmidt B, Nast-Kolb D. Damage control orthopedics in patients with multiple injuries is effective, time saving, and safe. J Trauma. 2005 ; 59(2):409-16.
2. Roberts CS, Pape HC, Jones AL, Malkani AL, Rodriguez JL, Giannoudis PV. Damage Control Orthopaedics-Evolving concepts in the treatment of patients who have sustained orthopaedic trauma. J Bone Joint Surg Am. 2005;87(2):434-49.
3. Dubert T, Voche P, Dumontier C, Dinh A. Le questionnaire DASH. Adaptation française d'un outil d'évaluation international. Chirurgie de la Main. 2001 ;20:294-302.
4. Meary. Correction des désordres post-traumatiques de l'articulation radio-ulnaire distale par intervention de Sauvé-Kapandji. Revue de ChirurgieOrthopédique et Traumatologie.1993;6:79:464.
5. Mansat P. Traitement des fractures anciennes de l'extrémité distale des deux os de l'avant-bras. Technique chirurgicales Orthopédie-Traumatologie. 2017 ;44:346.
6. Carter PB, Stuart PR. The Sauve-Kapandji procedure for post-traumatic disorders of the distal radio-ulnar joint. J Bone Joint Surg [Br]. 2000;82(B):1013-8.
7. Kacou AD1, Sié EJB1, Bamba I1, Lambin Y1. Résultats de la technique de Sauvé Kapandji dans les séquelles post-traumatiques du poignet. Afr J Orthop Trauma. 2016;1(1):57-63.
8. Baciu C. L'opération de Sauvé Kapandji dans le traitement des cals-vicieux de l'extrémité inférieure du radius. Ann Chir. 1997; 31 :323-9.
9. Pethapara Y, Singh V, Patel R. Radiological Assessment and Functional Outcomes of Hand and Wrist in Patients with Distal End Radius Fractures ; Trauma international. 2021; 7(2): 04-08.
10. Gartland JJ, Jr, Werley CW. Evaluation of healed Colles' fracture. J Bone Joint Surg Am. 1951; 33(4) :895–907.
11. Jupiter JB. Fractures of the distal end of the radius. J Bone Joint Surg [Am]. 1991 ;73-A:461-9.
12. Jacobsen TW, Leicht P. The Sauvé-Kapandji procedure for posttraumatic disorders of the distal radioulnar joint. Acta Orthop Belg. 2004;70:226-30.
13. Zachee B, De Smet L, Roosen P, Fabry G. The Sauvé-Kapandji procedure for non rheumatic disorders of the distal radioulnar joint. Acta Orthop Belg. 1994;60:225-30.
14. Kasotya D, Bhatia N, Yadav R, Sabat D. Side Swipe Injury to the

Leg. A Hefty Price for an Autorickshaw Ride: A Case Report. Trauma international. 2021; 7(2): 12-4.
15. Devender Kasotya , Nishant Bhatia , Rajeev Yadav , Dhananjay Sabat. Trauma International. 2021; 7(2): 12-4 .
16. Panda M, Ntungila N , Kalunda M, Hinsenkamp M. Treatment of chronic osteomyelitis using the Papineau technique. International Orthopaedics (SICOT). 1998 ;22: 37-40.

How to Cite this Article

Adendjingue DM, Chigblo SP, Goukodadja O, Padonou A, Tidjani IF, Akue AHM | Management of a Polytrauma Case In a Resource-Constrained Hospital | July-December 2022; 8(2): 21-25 | https://doi.org/10.13107/ti.2022.v08i02.030