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Case Report
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How is the Long-Term Quality of Life Following Hemicorporectomy? A Case Report of a Patient with 16 Years of Follow-Up

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Abstract

A 25-year-old male patient was referred due to a motorcycle accident that occurred five years previously. The injury had caused a fracture at the D10 level and paraplegia with a sensitive level compatible with the injury. His neurological status was classified as Frankel A.

Introduction

Hemicorporectomy (HC), or translumbar amputation, is a radical surgery that involves amputation of the pelvis and lower extremities by disarticulation through the lumbar spine with concomitant transaction of the aorta, inferior vena cava, and spinal cord. It is also accompanied by the corresponding urinary and intestinal diversion. It was initially proposed by Kredel [1] in 1951, but successfully performed for the first time by Kennedy et al. [2] in 1960. Initially indicated for severe invasive tumors of the pelvis, HC has also been proposed for severe pelvic and lower extremity trauma [3], vascular malformations [4], acute aortic occlusion [5], recurrent perianal and scrotal fistulas and intractable decubitus ulcers in paraplegic patients [6], and end-stage pelvic osteomyelitis [7-9]. The death rate is about 50%. To date, 66 cases of HC have been described in the literature [10]. Although this high mortality rate has decreased in recent years, the equipment of the entire lower body continues to be extremely complex and poorly tolerant. Therefore, most of the patients are confined to a wheelchair, and their social and labor inclusion is extraordinarily limited. The purpose of this paper is to report a patient who required a hemicorporectomy as a consequence of severe pelvic osteomyelitis with special focus on his complex prosthetic equipment and his quality of life at 16 years after his extreme surgery.

Case Presentation

A 25-year-old male patient was referred due to a motorcycle accident that occurred five years previously. The injury had caused a fracture at the D10 level and paraplegia with a sensitive level compatible with the injury. His neurological status was classified as Frankel A. Due to his poor hygienic care, he evolved with multiple non-healing sacral, leg, and trochanter decubitus ulcers, which required various surgical procedures, including a bilateral infrapatellar amputation. This irreversible condition continued to evolve and gradually resulted in the development of massive pelvic osteomyelitis, which required a permanent bladder size and a Hartmann surgery (colostomy).

The preoperative nutritional status, according to the Gomez classification [11], was 58%, corresponding to severe malnutrition, with a body mass index of 15. The Short Form-36 Health Survey (SF-36) [12] to evaluate generic health-related quality was applied. The scale is from 0 (maximum disability) to 100 (less disability). The score was 15. Due to the nature and extent of his pelvic osteomyelitis, and without the option of conservative treatment, the only remaining surgical option was HC (Figure 1). Psychological counseling was provided, and informed consent for surgery was obtained. The multidisciplinary operation team included orthopedic surgeons, an anesthesiologist, a urologist, and general surgery surgeons. The team, led by one of the authors, carefully planned the operation and decided to carry out a one-stage procedure. The surgery was performed in a 'front-to-back' approach (Figure 1).

A bilateral ilioinguinal approach expanded to the proximal was performed to create a flap that covers the posterior defect. Colostomy and ureterostomy were performed. The vena cava and both common iliac arteries were ligated. The Batson's plexus was dissected and ligated, and the disarticulation was performed at the L3 level to L4 level.

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Figure 1: Patient's status at the time of surgery.

Figure 2: A plaster basket with structural rib support was mounted on a rigid wood platform that allowed the patient to remain in an upright position.

Figure 3: A basket corset made with acrylic and carbon laminate, with an interior covering of plastazone rib support was performed.

The subsequent postoperative course was without any clinical event; except for wound dehiscence on the sixth day, which needed multiple healings. His initial septic condition improved significantly, and after 5 months postoperatively, a neobladder was performed using the Bricker technique; in the same procedure, a local flap was designed to cover the residual defect. During the first months, a therapist-assisted upper limb strengthening plan began. Once the

Figure 4: Complete patient equipment.

Figure 5: Cosmesis outcome.

wound was fully healed, a plaster basket with structural rib support covered in its interior with plastazote flexible foam liner was tailored. It was mounted on a rigid wood platform that allowed him to remain in an upright position. Subsequently, the basket was removed, and rib pressure zones were evaluated; any necessary corrections were then made. The regular use of the basket continued during the following 2 months until the patient achieved a permanent use of 6 h with excellent tolerance. This first device was used for 3 months (Figure 2).

Then, a basket corset was made with acrylic and carbon laminate, with an interior covering of plastazone rib support and suspended by a shoulder harness (Figure 3). The rest of the lower limb prosthesis was attached. Anthropometric measurements were taken to return to their original size. The hips were replaced by the 7E5 modular prosthetic hip joint (Ottobock SE and Co. KGaA) that has a manual lock automatically, which engages in full extension to add stability and can be manually disengaged for sitting. The polycentric prosthetic knee joint 3R20 (Ottobock SE and Co. KGaA) that allows an adjustable extension stop was incorporated. The dynamic prosthetic foot SACHS (Ottobock SE & Co. KGaA) was adapted (Figure 4). Remaining standing was the initial treatment objective, then ambulation (pendulously with a walker), and finally, his capacity to sit and climb up and down steps. This entire process lasted for approximately 6 months until the patient achieved independence.

Figure 6: Patient's current status.

Finally, the prosthesis was covered with a foamed plastic to improve the cosmetic outcome (Figure 5).

Results

The patient's follow-up was 16 years. The Barthel Index [13] (BI), Locomotor Capabilities Index [14] (LCI) and SF-36 were applied to the evaluation. The BI is a scale used to measure performance in Activities of Daily Living (ADL). Ten variables describing ADL and mobility are scored, with a higher number reflecting a greater ability to function independently. According to Shah et al. [15] a total BI score of 0 to 20 suggests total dependence, 21 to 60 severe dependence, 61 to 90 moderate dependence and 91 to 99 slight dependence. A score of 100 indicates that the patient is independent of assistance from others. The score obtained for our patient was 80 (moderate dependence). The LCI is a disease-specific instrument for assessing locomotor abilities that are considered essential for ADLs of people with lower-limb amputation and an enabling factor associated with long-term prosthetic use. It is composed of 14 answers with a possible maximum score of 56 points. The patient obtained a score of 31 points, and the SF-36 point was 74. From a social point of view, the patient achieved full integration. He lives with a partner, works, performs daily physical activities and drives a car, and he is even a car runner. He reports being extremely grateful and satisfied with the procedure performed and does not hesitate to advice patients who are in the same terminal situation (Figure 6).

Discussion

In a situation as drastic as HC, the need for teamwork is essential to achieve satisfactory results with low morbidity and mortality. This involves the coordination of various surgical and clinical services, and the rehabilitation and physiology department (to keep the patient motivated). This is critical since HC is associated with multiple comorbidities [7,8,16]. Therefore, perioperative clinical management is essential and must be focused on the correct treatment of the acid-base balance, and cardiovascular and respiratory function [17,18]. Janis et al. [17] reported a 53% survival rate in the treatment of 11 cases of HC. Barnett et al. [19] described 2 of 11 patients who had died at the end of the follow-up, but with a very prolonged hospitalization and clinical complications. The goal of rehabilitation after HC is to restore the patient's independence and mobility. However, this is not easy to achieve as approximately 40% of patients eventually fail to accept the prosthesis. Most patients described in the literature are equipped with a costal support basket and are capable of moving around in a wheelchair [17,20]. The equipment of the lower limbs is associated with many complications. The low walking speed allowed by the prosthesis and the need for assistance with a walker are frequent reasons for rejection. It has been recognized that the complex physiological and psychological sequela of this procedure also complicate the prosthetic management of this group of patients. Prosthesis must meet specific requirements: it must allow an upright and stable position with maximum freedom of the upper limb, maintain body support without excessive intra-abdominal pressure, and allow free breathing and unobstructed access to urological and intestinal drains. The total lower body prosthesis presents significant challenges for its manufacture. To the best of our knowledge, the complete equipment of a patient with HC has not been reported in the long-term literature. Achieving good prosthetic tolerance significantly increases the patient's independence and acceptance. In our case, almost complete social integration was achieved due to his equipment and good tolerance to them. In addition, he obtained high scores in the analysis of functional results.

The use of a multidisciplinary team is essential to reach the objectives. In motivated patients with adequate rehabilitation, it is possible to achieve complete equipment that allows the patient to have a good quality of life and be adequately integrated into society.

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