Rehabilitation management of Hemicorporectomy

Daniela Potas Cavalheiro, PT, João Eduardo Marten Teixeira, MD, Douglas Martins Braga, PT, Claudia Vöhringer Pessoa, BS, Marina Ceregatti, PT, Sheila Jean McNeill Ingham, MD PhD

PII: S1934-1482(15)00143-4
DOI: 10.1016/j.pmrj.2015.03.012
Reference: PMRJ 1456

To appear in: PM&R

Received Date: 3 August 2014
Revised Date: 1 March 2015
Accepted Date: 7 March 2015

Please cite this article as: Cavalheiro DP, Marten Teixeira JE, Braga DM, Pessoa CV, Ceregatti M, Ingham SJM, Rehabilitation management of Hemicorporectomy, PM&R (2015), doi: 10.1016/j.pmrj.2015.03.012.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
Rehabilitation management of Hemicorporectomy

Daniela Potas Cavalheiro\(^1\) PT, João Eduardo Marten Teixeira\(^1\) MD, Douglas Martins Braga\(^1\) PT, Claudia Vöhringer Pessoa\(^1\) BS, Marina Ceregatti\(^1\) PT, Sheila Jean McNeill Ingham\(^1,2\) MD PhD

1 – Associação de Assistência a Criança Deficiente (AACD) – Sao Paulo, SP – Brazil

2 – Physical Medicine and Rehabilitation Division, School of Medicine – Federal University of São Paulo - Sao Paulo, SP – Brazil

**Corresponding Author**
Sheila Jean McNeill Ingham MD, PhD
Rua Abilio Soares, 227
São Paulo – SP
04005-000
Brazil
Phone: (55-11) 3889-8244
E-mail: sheila.ingham@gmail.com

This material has not been presented at an AAPM&R Annual Assembly

**Conflict of interest**
The authors have no conflict of interest to disclose

This study received no funding
Rehabilitation management of Hemicorporectomy

ABSTRACT
This is a case report of a 55-year-old female that was treated with a hemicorporectomy consequent to an invasive undifferentiated sacral chordoma. We describe the clinical course and rehabilitation process in an amputee outpatient clinic, and report outcome measures such as the modified Functional Reach Test (mFRT), the Amputee Mobility Predictor (AMP), the Functional Independence Measure (FIM), and the Short-Form Health Survey (SF-36) after 9 months of rehabilitation.

INTRODUCTION
Hemicorporectomy (HC), or translumbar amputation, is an ultra-radical surgery developed in the 1960s (1) and is performed in extreme circumstances such as locally advanced malignancies of the pelvic organs, skin, or musculoskeletal structures and chronic ulcer complications (1-3). This salvage surgical procedure results in several long-term challenges, including hypertension, weight gain, stoma management, skin care and reduced function and quality of life (1, 3-6). Because of the physical and psychosocial challenges, rehabilitation is essential to re-integrate the patient into society. To this end, it is essential that a multidisciplinary team work together to present reasonable expectations from rehabilitation and to help the patient achieve the optimal functional outcome.

CASE PRESENTATION
A 55-year-old female, with no prior cancer history, was diagnosed with a locally invasive undifferentiated sacral chordoma (figure 1). This mass had an extension to
buttocks and pelvic cavity measuring approximately 176 x 257 x 158 millimeters and the MRI showed high signal intensity on T2-weighted images. There was no evidence for distant metastases. The tumor could not be fully resected by abdomino-perineal resection, pelvic exenteration, or hemipelvectomy.

She underwent two surgical procedures (to decrease tumor size) and, finally, four months prior to admission in our rehabilitation center, she underwent a HC that included disarticulation of lumbar spine at the L4-L5 level, transection of the spinal cord with resection of the bony pelvis, bladder, genitalia, rectum, and both lower extremities. She developed a skin flap complication secondary to soft tissue necrosis, which led to a second surgical revision 2 months after the amputation.

During the post-operative period the patient had already received information and training regarding the stoma management, skin protection and skin ulcer prevention. A comprehensive list of the patient’s impairments and ailments included: phantom pain, depressed mood, muscle fatigue, skin care and adequate positioning, wheeled mobility and transfers, and independence for activities of daily living. Her phantom limb pain was initially managed with anti-depressants and anticonvulsants. After medication titration, her final prescription included carbamazepine 800mg per day, fluoxetine 20mg per day and olanzapine 10mg per day.

Physical examination revealed loss of independence in activities of daily living (bathing, dressing, eating, transferring, and toileting). Also, her trunk control was poor. She was not able to role to any side or to sit up from a lying position, and she used her arms to support herself while sitting. Manual Muscle Test (Medical Research
Council scale) revealed decreased muscle strength (grade 3/5 - active movement against gravity only) for all trunk and abdominal muscle groups. She was not able to use a manual wheelchair due to her lack of trunk control and upper extremity muscle weakness. The focus of the rehabilitation program was to achieve independence in rolling, scooting, supine and prone lying; dressing and managing ostomy appliances; transferring from bed to her wheelchair; and wheelchair propulsion on level surfaces.

We initiated an outpatient based rehabilitation program that lasted a total of 9 months. The initial phase of the post-operative rehabilitation program emphasized water-based therapies. Aquatic therapy (twice a week) offered an ideal environment to increase flexibility, muscle strength and trunk control (figure 2). Problems with self-image, depression, and coping strategies were monitored from the beginning of her treatment and individual weekly psychological counseling was instituted. The initial challenges of the psychological intervention were: to modify her initial response of coping by avoidance/escape to confrontation from others; to resist a dominant idea of staying in bed (waking up was the most harrowing moment of the day, as she had the impression of living in a constant nightmare); to maintain her frequency to therapies at the rehabilitation center (her first social activity after surgery) and to continue her previous hobbies of reading and painting. Some of the results observed were: increased *élan vital* (vital force) and decreased sleepiness, self-management of colostomy (which led to a very positive effect on self-esteem) and gradual increase in social participation.

Outcomes measures performed prior to treatment and after the 9 month rehabilitation program were: Modified Functional Reach Test (mFRT) (7), Amputee Mobility
Predictor (AMP) (items 1, 2 and 3) (8), Functional Independence Measure (FIM), and the Short-Form Health Survey (SF-36) (9). The mFRT was used to determine patient’s stability by measuring the maximum distance she could reach in three conditions: sitting near the wall and leaning forward, to the right and to the left. The initial evaluation showed that the patient could not lean in any direction due to decreased stability and balance (0 cm in each of the three trials). She presented with a normal range of motion in her upper extremities, but the Manual Muscle Test (Medical Research Council scale) showed a decreased muscular strength of 4 (full range of motion against gravity, moderate resistance) on all muscle groups due to disuse.

At the end of the 9-month period, the Modified Functional Reach Test showed improved reach capacity on leaning forward (5 cm), to the right (2 cm), and to the left (3 cm) and upper extremities muscle strength returned to normal (grade 5 - full range of motion against gravity, maximum resistance). All three AMP items improved from 0 to 2 (maximum). Functional Independence Measure’s results are shown in table 1 and SF-36 results are shown in figure 3.

After 9 months of outpatient therapy, the patient completed her rehabilitation course. She became completely independent at the wheelchair level. Her house, where she lived with her husband, was completely remodeled: the doors were changed so that they were wider; kitchen utensils, the microwave and the stove were lowered so that the patient could have access in her wheelchair; in the bathroom the shower stall was widened, the curb was removed and two support bars were added for toilet use. She became independent for rolling from side to side and sitting up, for transfers in flat
and uneven surfaces (to the bed, other furniture, toilet, shower bench). To transfer into the car, she used a front on/back off sliding board, with help from her husband. She was independent for self-care: hygiene, stoma management, dressing (room cupboards were also modified so that she could reach her clothes independently) and showering. She went back to her painting activities and participated in the illustration of a book.

The patient maintains follow-ups every 6 months at the Rehabilitation Centre and has had no complications. At the one-year follow-up, she had maintained her FIM and SF-36 scores but reported an eight-kilogram weight gain.

**DISCUSSION**

Hemicorpectomy is a rare surgical procedure associated with devastating effects including altered body image, autonomic function disturbance, and several consequences on physical functional abilities (6). This case report describes the rehabilitation and outcome measures in a patient following HC. She presented to the rehabilitation center with complete loss of independence in her ADLs and depression. After 9 months, she was independent and had returned to her social activities.

The possibility of a prosthesis was initially discussed by the rehabilitation team (physiatrist, physical therapists, psychologist and prosthetist) and the main concerns were the patient’s age and the energy expenditure of walking with the prosthesis (10). Energy consumption for gait after a bilateral transfemoral amputation can reach 280% (11) compared to normal controls and we can only assume that a HC would lead to even greater energy consumption and fatigue. Previous reports on rehabilitation after HC suggest the use of prosthesis (bucket prosthesis with prosthetic legs for cosmetic
reasons or for limited ambulation) (12) in order to enhance trunk control and improve functional use of upper extremities (1, 5, 6, 13). When inquired, our patient had no interest in the use of prosthetics due to the cumbersome nature of the prosthesis, the need for more time in the rehabilitation program and the great effort that this would entail. The major difficulties in using prosthesis are related both to psychological and technical difficulties. The main technical difficulties are related to: i) restricted abdominal wall expansion and increased intra-abdominal pressure promoting stoma prolapse (5); ii) vertebral bony prominences (5) and iii) manage the large amount of soft tissue at the distal end of the stump (3).

The question of psychological adjustment to HC and the issues surrounding the procedure are a major concern (1). It is important to maintain regular contact with patients following such major life-altering events in order to help them maintain independence and motivation as life expectancy after HC may now reach over 20 years (13). Physiatrists must be aware of long-term medical issues such as weight maintenance, skin health, and conditioning (1).

**Conclusion**

We have presented a case report in which a patient underwent a comprehensive rehabilitation program following a hemicorpectomy, describing the specific techniques and barriers to recovery. HC is a life-saving procedure with a long life expectancy and it is imperative that the rehabilitation team is integrated and well organized to provide a range of services including physical and functional retraining, education, and psychological support. Our patient was able to successfully return to home in a semi-dependent living environment
REFERENCES


FIGURES legends

Figure 1 – Sagittal T2 MRI image of the lumbosacral region showing the tumor measuring 176 x 257 x 158 mm. The lesion has a high intensity and a heterogeneous enhancement after paramagnetic contrast was used.

Figure 2 – Balance training during an aquatic therapy session.

Figure 3 – Graph showing SF-36 results
Table 1 – Functional Independence Measure results

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIM self-care</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>FIM sphincter control</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>FIM transfers</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>FIM locomotion</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>FIM communication</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>FIM social cognition</td>
<td>11</td>
<td>19</td>
</tr>
</tbody>
</table>

Legend: FIM = Functional Independence Measure; beginning = scores at the beginning if the rehabilitation program; end = scores at the end if the rehabilitation program.