Post Operative Functional Outcomes in Patients After Titanium Mesh Cage in Thoracic Spine

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1. Introduction

The use of cages for stabilization procedures in the spine takes its origin from the work of Bagby, who developed a stainless-steel basket, which could be packed with cancellous bone in order to stabilize the necks of horses with Wobbler Syndrome (a form of cervical myelopathy seen in race horses). Better results were achieved than with the Cloward technique. The application of Titanium Mesh Cages (TMC) for spinal stability and fusion opened new techniques in spine surgery. A range of equipment are accessible for thoracic spine stability and reconstruction; Titanium Mesh Cages, pedicle screws, and flaps have been publicized in terms of promoting fusion provide excellent structural support.

1.1 Indications for TMC placement

1) Tuberculosis of spine
2) Infection
3) Tumor
4) Trauma
5) Degenerative disease
6) Fracture Vertebral
7) Osteoporosis
8) Deformity correction (scoliosis, kyphosis)
9) Miscellaneous conditions etc. (5)

1.2 Objectives

To describe the functional outcome after TMC application in Thoracic spine within one year postoperatively.

1.3 Rationale

The current research enabled us to assess the effectiveness of TMC surgery in terms of functional abilities of patients including ADL’s and IADL’s.
1.4 Operational Definitions

1.4.1 Assessment of Functional Outcome
Functional Outcome is measured by using The Barthel ADL index or Barthel scale, Bed Mobility Profile and Manual Muscle Testing.

1.4.2 Barthel scale or Barthel ADL index
Barthel scale is an ordinal scale used to assess performance in daily life activities (ADL). Ten variables are used to ten variables to relating mobility and ADL. Item scores are gather to present a total score ranging from 0 to 100 (0: complete dependent; 100: complete independent). (9)

1.4.3 Bed Mobility Profile
Bed Mobility Score provides base to count the independence in mobility of transferring from bed, the capability to go up in and out of a chair and bed. It is a common problem in elders, mainly those residing in expert nursing services. Total score of Bed Mobility Profile is counted out 77 in which eleven bed mobility activities are observed.

1.4.4 Manual Muscle Strength Testing
Manual Muscle testing will be used to measure the strengths of lower limb muscles. (10) Muscles group which are in the range of grade 1-2 is included. e.g. flickering. Grade 3 muscle strength is categories as gravity free. e.g. Straight Leg Raise. Muscles group works against gravity and with resistant are included, Grade 4-5. e.g. Knee extension with weight.

1.5 Methodology

1.5.1 Sample Selection
An institutional database of Ghurki Trust Teaching Hospital was explored to discover all patients who undergo Titanium Mesh Cage in thoracic spine between January, 2011 to December, 2012.

1.5.2 Sample Size
62 patients participate in study.

1.5.3 Setting
Ghurki Trust Teaching Hospital, Lahore

1.5.4 Duration of Study
Study will be completed within 4 month period from November 2013 to February 2014.

1.5.5 Study Design
Case series.

1.5.6 Inclusive Criteria
- Patients from all the age group will be selected.
- Patients underwent thoracic cage application at Ghurki Trust Teaching Hospital between January, 2011 to December, 2012
- Both genders

1.5.7 Exclusive Criteria
- Patient with multiple surgery.
- Patient with bullet injury.

1.5.8 Data Collection
An institutional database of Ghurki Trust Teaching Hospital was explored to discover all patients who undergo Titanium Mesh Cage in thoracic spine between January, 2011 to December, 2012. All patients fulfilling the criteria for study is include. Written consent forms, demographic information and detailed history was taken and clinical examination is performed (if patient is available).

1.5.9 Data Analysis
The data was entered and analyzed by Statistical Package for Social Sciences (SPSS) version 21. Numeric data like Barthel scale, Manual muscle testing score and bed mobility profile score were presented as mean ± SD and qualitative data like gender, Bed profile grouping and Barthel index grouping were presented as frequency and percentage. Wilcoxon signed-rank test was applied for comparing two related samples. Significance for statistical tests was accepted at ≤ 0.05 level of probability.

2. Results
The current research enabled us to assess the effectiveness of TMC surgery in terms of functional abilities of patients including ADL’s and IADL’s. In this study, Mean age of the patients was 39±19.54. There were 34 (54.84%) males and 28 (45.16%) female patients. Males mean age was 44.71±19.58 and females age average age was 32.07±17.52.

Cage implantation is done on each segment of thoracic spine. In our study, Majority of patient have cage implant at the T6-T11 level of Thoracic spine.

2.1 Barhtel Index Score

Above graph shows that there is improvement in barthel index score post op., majority of patient is lie in moderate dependent group.

2.2 Bed Mobility Profile
There is increase in bed mobility score after post op.; 56 patients lie in independent Bed Mobility profile group as shown in graph.

2.3 Wilcoxon rank sum test

<table>
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<th></th>
<th>n</th>
<th>Mean</th>
<th>Wilcoxon rank sum test</th>
<th>p-value</th>
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</thead>
<tbody>
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<td>Post Op. Bed Mobility Profile</td>
<td>62</td>
<td>62.29±11.712</td>
<td>6.827</td>
<td>&lt;0.001</td>
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<td>Pre Op. Barthal Index</td>
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<td>58.98±17.726</td>
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<td>Post Op. Barthal Index</td>
<td>62</td>
<td>84.19±10.732</td>
<td>6.827</td>
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</tbody>
</table>

There was mean difference of 28.129 between Pre and Post Op Manual Muscle Testing. The difference was statistically significant different (p-value <0.001). There was mean difference of 35.16 between Pre and Post Op bed Mobility Profile. The difference was statistically significant different (p-value <0.001). Mean of Pre Op bed mobility profile is 28.13. Mean of Post Op bed mobility profile is 63.29. Shows increase in bed mobility score after TMC application in thoracic spine. Similarly, there was mean difference of 25.71 between Pre and Post Operative Barthel index score. The difference was statistically significant different (p-value <0.001).

3. Conclusion

After TMC application in thoracic spine there is improvement in the muscle strengthening with time. Mean difference of 35.16 between Pre and Post Op bed Mobility Profile. There is increase in patients ability to rise in and out of a bed and chair.

Increase barthel index score in Post Op. Patient, independence from any help to perform their daily activities independently. There is significant difference between Pre & Post Operative Barthel Index Score. After TMC application in thoracic spine there is progress from dependency to independent life. TMC is a safe and effective device in restoring functional activities without recurrence of any complication. TMC is the ideal treatment in cases of spinal anterior instability due to its related excellent functional outcomes.

References