Original article

Post operative pulmonary complications in patients underwent neurosurgical interventions

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Abstract:

Objectives: The study was done to determine the rate of post operative pulmonary complications in patients underwent neurosurgical interventions.

Materials & Methods: A descriptive explorative study was carried out in patients underwent various neurosurgical interventions in Medical College Hospital, Kerala by physical examination and biophysical measures. During the two month study period 40 patients underwent neurosurgical interventions were examined to find out the rate post-operative pulmonary complications.

Results: A total of 40 patients underwent various neurosurgical interventions were examined and their respiratory status were graded by using a Respiratory Status Grading Scale (RAS). Out of total 40 patients screened 22 were males (55%) and 18 were females (45%). In the sample 31 patients had no unhealthy habits that adversely effect the respiratory status. All the 40 patients had mild to severe deterioration in their respiratory status even after providing conventional chest physiotherapy. Acinetobacter species were more predominant in the sputum of the patients after the neurosurgical interventions.

Conclusion: Deterioration in respiratory status of the patients underwent neurosurgical interventions were inevitable even after providing conventional chest physiotherapy, the health care sorority should think about newer innovations in respiratory care of neurosurgical clients in order to prevent post-operative pulmonary complications.

Key words: Neurosurgical Interventions, Post operative Pulmonary Complications, Respiratory Status Grading Scale, conventional chest physiotherapy

Introduction:

Good respiratory function is a sign of overall health. Guiding the surgical patient safely and efficiently through the post-operative course is the goal shared by the entire health care team. Unfortunately post-operative pulmonary complications (PPC) frequently defeat this objective. PPC not only contribute to increased morbidity and mortality; they are a major factor for medical expenditures - especially in terms of intensive care utilization. In developed countries figures shows that respiratory tract infections in various groups including surgical clients are the seventh most important cause of morbidity and sixth commonest cause of mortality (the mortality rate being 10%). Pasteur, in 1908, was the first to recognize atelectasis in the postoperative patient. Palmer stated, in 1952, that atelectasis was the most common PPC and it remains so today. The number of operative procedures continues to increase annually, as does the cost of hospital
care. According to American Association of Neurological Surgeons reported that there are approximately 1.7 million traumatic brain injury cases in United States alone. In this there are nearly 2 lakhs clients may need surgical intervention.3

A 6-month prospective study in 4 general surgical wards and one urology- surgical ward in a hospital in Nottingham, England, revealed 38 cases of infection constituting 1.0% of admissions to the wards. Abdominal surgery preceded 28 of the infections. Interestingly, of 4 patients subjected to cystectomy all developed lower respiratory tract infection. Potential respiratory pathogens were isolated from 21 patients (56%) and Streptococcus pneumonia and Haemophilus influenzae were considered to be the most common likely causes of infection.4

A three year retrospective analysis of complications and the factors influencing their occurrence was carried out on all trauma patients admitted to the Intensive Care Unit (ICU) of Safdarjang Hospital, New Delhi from January 1995 to December 1997. The predominant complications seen in trauma admissions to the ICU were chest infection (36%). Morika Thoru of University medical school, Kumato reported that patients undergone neurosurgical interventions having cardio respiratory complications than that from neurological origin.5

Following neurosurgery, it is believed that mucociliary clearance is adversely affected due to effects of general anesthesia, intubation and pharmacological agents such as narcotic analgesics used in the perioperative period. Reduced ability to cough effectively due to altered level of consciousness and increase the pooling of secretions because of the long term immobility with a decrease in regional ventilation provides a good potential for pulmonary secretion formation. When we considering the case of post operativeneurosurgical patients in the intensive care units – the common problem noticed among them are ineffective airway clearance and decreased gaseous exchange. But unfortunately the health team focuses their attention mainly on the root problem for which the client sought surgical interventions. Because of the combined effort; it may end with a success, at same time so many other ailments may trespass and conquer the place of root problems.

The above listed facts motivated the investigators to determine the present rate of postoperative pulmonary complications in neurosurgical clients with a view to aware the healthcare alliances regarding its depth and to formulate the modified version of chest physiotherapy exclusively for the patients underwent neurosurgical interventions.

Aims & Objectives:
1. Assess the respiratory status of patients undergone neurosurgical interventions as measured by physical examination and biophysical measures.
2. Identify the major micro-organisms responsible for post-operative pulmonary complications in patients underwent neurosurgical interventions.

Materials and Methods:
A descriptive explorative study was carried out in patients underwent various neurosurgical interventions in Medical College Hospital in order to find out the rate of post-operative pulmonary complications. The neurosurgery department of Medical College Hospital was selected for the study. In this study the patients who had undergone neurosurgical interventions are the population. The
sample consisted of 40 patients who had undergone various neurosurgical procedures. The inclusion criteria include the patients those who are admitted in the neurosurgery department for surgical interventions as they are willing to participate in the study and they would have normal respiratory status pre-operatively and no habit of smoking. In the study, non-probability purposive sampling technique was used for selecting the sample.

An Interview schedule was used for collecting the socio-demographic data and clinical data and Respiratory Status Grading Scale (RSGS) developed by the investigators were used to assess the respiratory status of the neurosurgical clients. To ensure the content validity of the tools, it was submitted to 6 experts from the field of medical surgical nursing, respiratory medicine and neurosurgery. Based on their suggestions minor modifications were made and all the tools were finalized. The inter-rater reliability of tool II was checked by using the Cohen’s Kappa. The reliability coefficient was found to be 1.000.

A pilot study was conducted in 6 patients and the responses are collected with the proposed tool. The data collected were amenable to statistical analysis and the study was found to be feasible.

After formal administrative sanction was obtained from the institutional Ethical Committee and head of neurosurgery department, data collection process began with the identification of the patients who met the sample criteria. Their or family members willingness to participate in the study was assessed. After explaining the purpose and nature of the study informed consent was obtained for participation in the study. The confidentiality of the participant was assured. The socio-demographic data and clinical data of the samples were collected using interview schedule and assessed the respiratory status with Respiratory Status Grading Scale (RSGS) prior to the neurosurgical interventions and patient’s respiratory were assessed continuously for 7 days post-operatively by using Respiratory Status Grading Scale (RSGS). Statistical analysis of the relevant data was done using appropriate statistical tests.

**Results:**

Out of total 40 patients screened 22 were males (55%) and 18 were females (45%). The majority of the samples between the age group of below 25 years and between 46-55 years. 15% of the patients sought neurosurgical interventions due to traumatic brain injury and 85% due to other diseases. 28 subjects had no history of any systemic illnesses but all the subjects are free from respiratory diseases. 77.5% of subjects had no unhealthy habits that are adversely affect the respiratory system. Before the neurosurgical interventions all the subject’s sputum culture were sterile but after the neurosurgical interventions only 55% of subjects had sterile sputum culture results and highly pathogenic organisms were identified in sputum culture results of 45% of subjects. Acinetobacter species were prominent.

Total out of 40 subjects 10 had severe alterations, 25 had moderate alterations and 5 had mild alterations in the respiratory status after the neurosurgical interventions.
Figure 1: Distribution Of Subjects based on sex

Table 1: Distribution Of Subjects based on age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 25 years</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>25 – 35 years</td>
<td>06</td>
<td>15.0</td>
</tr>
<tr>
<td>36 – 45 years</td>
<td>08</td>
<td>20.0</td>
</tr>
<tr>
<td>46 – 55 years</td>
<td>10</td>
<td>25.0</td>
</tr>
<tr>
<td>Above 55 years</td>
<td>06</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Figure 2: Distribution of subjects based on indication for neurosurgical interventions.
Table 2: Distribution of subjects based on history of systemic illnesses.
N=40

<table>
<thead>
<tr>
<th>Systemic Illness</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>03</td>
<td>07.5</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>07</td>
<td>17.5</td>
</tr>
<tr>
<td>Others</td>
<td>02</td>
<td>05.0</td>
</tr>
<tr>
<td>No other systemic illnesses</td>
<td>28</td>
<td>70.0</td>
</tr>
</tbody>
</table>

Figure 3: Distribution of subjects based on unhealthy habits.

Figure 4: Distribution of subjects based on sputum culture results before and after neurosurgical interventions.
Table 3: Distribution of subjects in the control and experimental group based on respiratory status after neurosurgical interventions

<table>
<thead>
<tr>
<th>RESPIRATORY STATUS</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal respiratory status</td>
<td>00</td>
</tr>
<tr>
<td>Mild alterations in respiratory status</td>
<td>05</td>
</tr>
<tr>
<td>Moderate alterations in respiratory status</td>
<td>25</td>
</tr>
<tr>
<td>Severe alterations in respiratory status</td>
<td>10</td>
</tr>
</tbody>
</table>

Discussion:
The findings of the present study are discussed in relation to the observations made by other studies, which the investigators had reviewed.

In the present study all the 40 samples had alterations in respiratory status ranging from mild to severe. Study conducted by Sogame.L.C (2008), post operative complications were identified in 24.6% underwent elective craniotomy and 10% of samples died because of pulmonary complications. In the present study it was found that majority of patients underwent neurosurgical interventions had respiratory problems at mild to severe range. That is among the 40 samples 12.5% had mild alteration in respiratory status, 62.5% had moderate alterations in respiratory status, and 25% had severe alterations in respiratory status. This in concordance with the findings of following investigators. Lily Luan and Yang Baozhong (2005). They found that incidence of respiratory tract infections are high in neurosurgical patients. Donald.A. Romingetal (2008). Demonstrates that in patients with brain injury significant morbidity due to bacterial changes in the respiratory tree.

Study conducted by KingaBagayi (2009) states that 27% of samples had bacteria in their saliva preoperatively and bacteria were again isolated from their sputum samples post operatively. In the present study organisms were isolated from the sputum of 45% samples after the surgical interventions. The findings of K Prashanth, and S Badrinathb (2006) states that Acinetobacterbaumannii accounted for 41.8% of all the nosocomial infections. In the present study Acinetobacter species were predominant in the sputum of the patients after neurosurgical interventions.
**Conclusion:**
Patients were underwent neurosurgical interventions had progressive decline in their respiratory status. Sometimes it may be the main cause of mortality and morbidity in patient who need neurosurgical interventions than the root problems. Our conventional chest physiotherapy methods are not much effective in neurosurgical clients because of their mobility constraints and rise in factors that promotes respiratory compromise. So the investigators were indulged in the work of budding newesth physiotherapy for neurosurgical clients.

**Acknowledgement:**
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**References:**