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OPERATING ROOM TIME MANAGEMENT IN NEUROSURGICAL OPERATION THEATRE: AN ANALYSIS

Anaesthesiology

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ABSTRACT

Background: Operation Theatre Time (OR Time) is very precious and its management requires to be streamlined to prevent loss of revenue to the hospital and at the same time providing better services to the patient without causing delay in operations. It is much more pertinent to neurosurgical operation theatre where the operations are usually prolonged.

Methods: 100 cases of both cranial and spinal surgeries were enrolled, to study the factors and timings which are affecting the OR time in our institute. The following times were recorded: Anaesthesia time, position time, draping time, surgery time, reposition time, reversal time, total time, clinical time and non-clinical time and analysed by appropriate statistics.

Results: The OR time can be divided as clinical time and non-clinical time. In our study the clinical time for cranial surgery was 254.95±69.55 and for spinal surgery it was 141.40±44.32. Non clinical time for cranial surgeries is 70.16 ±24.85 and for spinal surgeries 57.27±11.91.There is statistically significant difference in nonclinical time for cranial surgeries and longer in our institute compared to spinal surgeries ($p < 0.05$). Anesthesia time is significantly more for cranial surgeries (22.29 ±11.50) compared to spinal surgeries (14.87±9.70) ($p < 0.05$). The patient positioning time in cranial surgeries (16.35±9.15) is significantly more compared to spinal surgeries (10.14±7.72).The patient repositioning time after surgery is statistically significant and more in surgeries performed in prone position compared to surgeries performed in supine positions (5.93 ±4.62),whereas the patient positioning time not significant ($p>0.05$).

Conclusions: Our institute being a teaching university for both surgeons and anaesthetists, as well as for nurses, the time intervals of OR time utilization concerning the most of major neuroasurgical surgeries were within acceptable limits, being comparable to the time estimates of other studies.

KEYWORDS

Operation theatre, Operation time utilization and operartion theatre time management

Introduction

Operation theatre time (OR Time) management is very important as theatre construction and maintenance requires lot of expenditure. Precise time management is required for proper planning of the operation theatre list without postponing the cases on the day of operation and managing the patients turn over time and other timings like patient wheel in ,anesthesia time, patient positioning for surgery, surgery time, recovery time and wheel out time.[1]

The neurosurgical operation theatre is unique as compared to other operation theaters, because of prolonged duration of surgeries, intensive monitoring and a lot of time is consumed as the patient has to be placed in different positions to facilitate the surgery. All these along with the patient turnover time play a crucial role in the management of OR time in neurosurgical operation theatre. We have contemplated a study in our institute to find out the reasons if any for suboptimal utilization of neurosurgical operation theatre time.

Material and Methods

After Institutional ethical and research committee clearance 100 cases which were operated from November 2012 to January 2013 for 3 months were enrolled into our study and analysed using the following timings: [2, 3]

Anaesthesia time : Time from once the patient wheeled in to ready for positioning after giving anaesthesia.
Position time: Ready for position to end of positioning.
Draping time: End of position time to start of surgery.
Surgery Time: Start of surgery to end of surgery.
Reposition time: End of surgery to start of reversing anaesthesia.
Reversal time: End of reposition time to complete recovery of patient from anaesthesia.
Total Time for a case: Wheel in time to wheel out time.
Clinical Time: Anaesthesia time plus surgery time.
Non clinical Time: Total time minus surgery time plus anaesthesia time.

After recording all the times mentioned above the mean time with were standard deviation were calculated separately for cranial and spinal surgeries. All the timings were compared in the cranial and spinal surgeries.

Anaesthesia time is further divided in to three groups depending up on the type monitoring used namely: In group 1 standard monitoring which consist of ECG, ETCO2, pulse oximetry, NIBP, in group 2 along with standard monitoring intra-arterial blood pressure (IBP) monitored and in group 3 same as group 2 plus central venous pressure (CVP) also monitored. This done as the time for anaesthesia will vary according to the type of monitoring with or without invasive lines to be placed. All the three groups were compared.

The surgery usually done in different positions in neurosurgery. The cases were also divided in to supine or prone depending up on the position the operations were performed and the time was recorded for positioning and reposition. These timings for supine and prone positions were again compared. The data were presented as mean and standard deviation (SD), student t test used to compare the numerical data, the three groups were compared with ANOVA followed by Bonferroni (With Control) multiple-comparison test. P value < 0.05 was considered significant. NCSS version 10 statistical software was used for above calculations.[4]

Results

Anaesthesia time, position time, surgery time, total time, and non-clinical time of cranial and spinal surgeries are statistically significantly different. Draping time and reversal time are a little longer in cranial surgeries compared to spinal surgeries but not statistical significant. 17 cases were put on ventilator out of 100 cases were excluded in the calculation of recovery time in which 10 were cranial and 7 were spinal. (Table 1)

The clinical time for cranial surgery was 254.95±69.55 and for spinal surgery it was 141.40±44.32. Non clinical time for cranial surgeries is

70.16 ±24.85 and for spinal surgeries 57.27±11.91 at our institute. There is statistically significant difference in nonclinical time for cranial surgeries and longer in our institute compared to spinal surgeries ($p<0.05$) (Table 1).

The clinical time 78% and nonclinal time is 22% in cranial surgeries whereas in spinal surgeries it is 71% and 29% respectively in total time for a cases (Figure.2, 3)

Anaesthesia time was significantly more in group 3, where all the invasive monitoring lines were placed compared to group 1. (Table 2) The group 2 anaesthesia time was more compared to group 1 but not statistically significant. (Figure. 1).

The patient positioning time in cranial surgeries (16.35±9.15) is significantly ($p<0.05$) more compared to spinal surgeries. (10.14 ±7.72) (Table 1)

The repositioning time after surgery is statistically significant ($p<0.05$) and more in surgeries performed in prone position compared to surgeries performed in supine positions, whereas the position time is not significant. (Table 3)

Table 1:showing the different timings in cranial Vs Spinal surgeries.

Time (Minutes)	Cranial	Spinal	P Value
Anaesthesia time(Mean ±SD)	22.29 ±11.50	14.87±9.70	0.001*
Position time (Mean ±SD)	16.35±9.15	10.14±7.72	0.005*
Draping time (Mean ±SD)	13.38±6.29	11.33±7.60	0.256
Surgery time (Mean ±SD)	232.66±90.66	136.53±78.95	0.000*
Reposition time (Mean ±SD)	8.022±5.99	8.71±5.02	0.534
Reversal time (Mean ±SD)	9.5 ±6.11	8.87 ±8.30	0.703
Total time (Mean ±SD)	325.11±128.01	208.67±92.732	0.000*
Non clinical time	70.16 ±24.85	57.27±11.91	0.024*
Clinical time	254.95±69.55	141.40±44.32	0.003*

2: Monitoring Vs Anaesthesia Time

Monitoring	Anaesthesia Time(Minutes) Mean±SD	P Value F test
Group1	11± 5.92*	0.00029
Group2	16.25 ± 8.32	
Group3	21.82±12.24*	

3: The Positioning time and Reposition time in Patients Undergoing in Prone Vs Supine Position.

Time (Minutes)	Supine	Prone	P value
Positioning time (Mean ±SD)	13.15 ± 9.19	10.20 ± 8.66	0.105
Repositioning time(Mean ±SD)	5.93 ± 4.62	9.28 ± 6.00	0.002*

Discussion

The constraints of operation theatre time (OR Time) is very well known and we have to rationalise in such a way that minimum time is wasted and the OR time is maximally utilised.

The neurosurgical operation suite is quite different compared to other general operation theaters. These surgeries require advanced monitoring, special operating position placements and prolonged time for surgeries. The management of OR time in neurosurgical operation theatre is a difficult task. The optimum utilisation of OR time not only saves the financial spending but it will allow to perform surgeries without much delay.

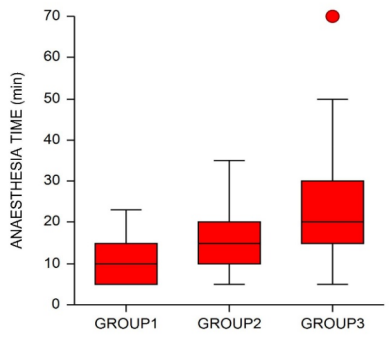

Figure1: The anaesthesia time in 3 different groups.

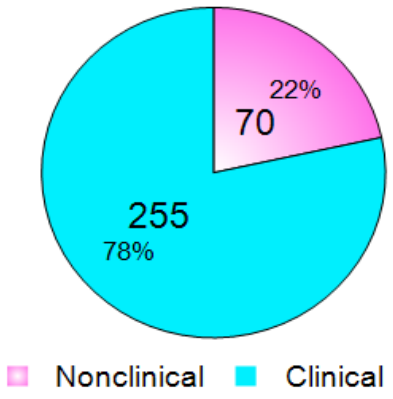

Figure 2: Distribution of theatre time in craniotomies

The OR time can to be divided into clinical time and non-clinical time. In our study the clinical time for cranial surgery was 254.95±69.55 and for spinal surgery it was 141.40±44.32. Iyer RV et al [3] found that the cranial surgery mean time taken was 220.90 minutes and for spinal mean time was 115.85.The time taken for both type of surgeries was little less compared to our study, but there is no statistically significant difference. The duration of a surgery depends on the patient's individuality, the unique characteristic of the disease, and the ability of the surgeon, but the mean duration of the procedure takes into account such variations. As our institute is a teaching there is a scope for improvement in performing surgeries by more and early involvement of faculty in starting and doing the surgeries.

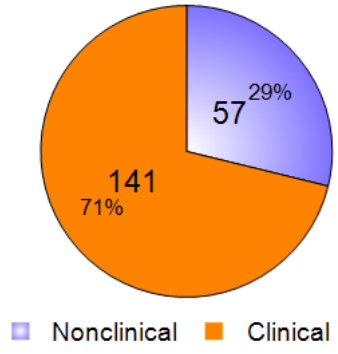

Figure 3: Distribution of theatre time in spinal surgeries

Non clinical time for cranial surgeries is 70.16 ±24.85 and for spinal surgeries 57.27±11.91 at our institute. In the study of Iyer RV et al [3] the nonclinical time for cranial surgeries 57.91±5.13 and for spinal surgeries 62.14±35 31. There is statistically significant difference in nonclinical time for cranial surgeries and longer in our institute.

Preparation and cleaning of the OR do not depend on such eventualities and are a part of a process with little variation.[5,6] Anesthesia time is significantly more in for cranial surgeries compared to spinal surgeries as more intense monitoring is required for cranial surgeries. The monitoring time in group 3 where all invasive monitoring modalities were used is statistically significant compared to group 1 where only non-invasive monitoring is used. The anaesthesia time can be reduced in our institute by starting the anaesthesia in preanaesthesia area and shifting the case to operation room whenever the operation table falls vacant.

Reposition time is significantly more in spinal cases compared to cranial surgeries in our study which can be reduced by keeping adequate manpower and other infrastructure ready just before the completion of the cases which were operated in prone position.

Our study was performed in teaching university hospital for both surgeons and anaesthetists, as well as for nurses, the time intervals of nine typical stages of OR time utilization concerning the most of major neuroasurgical surgeries were within acceptable limits, being comparable to the time estimates of other studies. Special emphasis towards improvement of OR time efficiency and outliers elimination should be paid on a sound organizational structure of transfer personnel service in conjunction to the augmented availability of anaesthesia providers and interdisciplinary collaboration.

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