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SURGICAL AUDIT OF EMERGENCY SURGERY WITH THE POSSUM SYSTEM

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ABSTRACT

Objective: To evaluate the validity of Physiologic and Operative Severity Score for the enumeration of mortality and morbidity (POSSUM) system in the audit of emergency surgery.

Material and Methods: This cross sectional study was conducted in the Department of Surgery, Hayatabad Medical Complex, Peshawar over a period of one year from June 2009 to May 2010. All the patients undergoing emergency midline laparotomy were subjected to risk-adjusted audit using the POSSUM scoring system. The observed mortality rate was compared to the POSSUM-predicted mortality.

Results: Out of 150 patients included in the study, 32 patients died within 30 days of operation. The POSSUM calculated deaths were 27. There was no statistically significant difference between the 'observed' and 'predicted' deaths.

Conclusion: The POSSUM scoring system is a good predictor of 30 day mortality for the patients undergoing emergency laparotomy.

Key Words: Surgical Audit, POSSUM, Emergency Surgery.

INTRODUCTION

Comparison of morbidity and mortality rates is an essential component of surgical audit[1]. For a good audit, it is important to compare the risk-adjusted mortality and morbidity rates instead of crude rates as the outcome is directly related to the risks associated with surgery[2]. For this purpose several risk scoring systems have been devised, out of them the POSSUM (Physiologic and Operative Severity Score for the enumeration of mortality and morbidity) has gained widespread acceptance. It uses 12 physiologic and 6 operative variables into account and on the basis of the degree of deviation from physiology and level of operative stress, each independent factor is scored as 1, 2, 4 or 8; the total physiological score(PS) and operative score(OS) obtained from the sum of the physiological and operative factors respectively.

POSSUM system has been found to be valid in accurately predicting the mortality and morbidity rates, although, a bit over prediction in low risk cases. Due to its accurate prediction, the POSSUM system has been evaluated in different surgical specialties including gastrointestinal[3], colorectal[4], vascular[5,6] orthopaedics[7] and neurosurgery[8]. Its validity has been tested in developed countries like the UK, USA, France and also in the developing countries like Malaysia[9], India[10] and Pakistan[11,12].

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MATERIALS AND METHODS

This cross sectional study was conducted over a period of one year from June 2009 to May 2010 at the department of surgery, Hayatabad Medical Complex, Peshawar. The design of the study was approved from the ethical committee of the hospital. Informed and written consent was taken from all the patients. A total number of 150 patients, both males and females were included in the study. All those patients who underwent midline emergency laparotomy were included in the study. Patients less than 18 years of age and those whose physiologic and operative parameters could not be calculated accurately were excluded.

The physiologic variables for each patient were recorded before the emergency laparotomy, the operative variables were recorded immediately after surgery with the help of the operating surgeon. The main outcome measure was "30 day mortality". All the patients were advised for a follow up visit after 30 days of admission. In case of non-compliance for hospital visit, follow up was done through telephone contact.

Data was recorded on a purpose built Microsoft Access® database and a paper proforma. The expected mortality rates were calculated according to the formula. The analysis of all the patients was done

by the exponential method of analysis. The observed mortality and morbidity rates were compared to the POSSUM calculated rates in different risk- bands, Chi square test was used to calculate the significance of difference between observed and calculated values.

RESULTS

A total of 150 patients with mean age 41.47±2.73 years (95% CI) were included out of whom 61(40.66%) were females and 89(59.33%) were males. The major operative findings of the emergency surgeries are summarized in Table 1. Thirty-two (21.3%) patients died within the first 30 days after index surgery, all of the deaths were observed during the index admission to the hospital. The rest of patients were followed up at the outdoor patients department up to 8 weeks postoperatively, out of whom12 patients failed to come and their follow up was done via phone. The POSSUM calculated deaths were 27(18.0%), the observed to expected deaths ratio was 1.18. The difference between the observed number of deaths and POSSUM calculated (expected) deaths was not significant (p=0.56).

Table 1: Major operative findings of the emergency surgeries

Major operative findings	n(%)
Ileal perforation	45(30)
Traumatic intestinal perforation	31(20.66)
Duodenal perforation	21(14)
Perforated appendix	18(12)
Liver/Spleen trauma	15(10)
Pelvic fracture	05(3.33)
Malignancy	05(3.33)
Major vascular injury	02(1.33)
Miscellaneous	08(5.33)
Total	150(100)

DISCUSSION

In the recent years, clinical audit is becoming more and more important for several reasons including increasing level of awareness, on-going research and development in the field of healthcare; assessment of proper utilization of available resources and assessment of cost-effectiveness of healthcare provisions and last but not the least, the assessment and comparison of outcomes among doctors and institutions. For these reasons audit has a role in making the health system more efficient, uniform and cost-effective. Audit of a case-mix can be a challenging task especially when the risks associated with different surgical procedures are different, for example a hospital or a surgeon performs high risk cases, the mortality and morbidity rates will be definitely higher when compared to a center/surgeon who performs surgeries on low risk cases. For this reason the concept of risk-adjusted audit evolved and POSSUM has gained widespread acceptance in this regard.

Having 30-day mortality as an end point variable, the expected (or POSSUM calculated) deaths were not significantly different from the observed or actual number of deaths in all the patients. This data correlates with the international and national literature. One study from Delhi[10] in which audit of emergency surgery was done, yielded the same results. Similar results have been validated across the globe in emergency as well as elective procedures[2,3].

The POSSUM is a good tool for risk-adjusted surgical audit, however, the mechanism of calculation i.e. the exponential method is a cumbersome way of analyzing a group of patients. To overcome this drawback, the Portsmouth POSSUM or P-POSSUM was designed by Prythersch et al, in which a linear method of analysis was used. The P-POSSUM proponents argue a more accurate prediction of mortality rates, however, subsequent studies on both the models yield almost parallel results. The advantage of using the POSSUM system is that it can be used in the audit of morbidity as well in addition to audit of mortality, whereas the P-POSSUM equation only calculates the mortality of patients.

The POSSUM system gained widespread acceptance throughout the globe very rapidly and yielded reproducible results. Due to its accurate prediction of mortality and morbidity rates, initially designed for general surgery, the POSSUM system of audit has been adopted in various subspecialties of surgery like colorectal[14], upper gastrointestinal[15], oesophageal[16], vascular, orthopaedic and neurosurgery. Despite its usefulness, there are certain drawbacks to this scoring system. It takes into account only those cases in a surgical ward who undergo surgery, although a fair number of patients are treated conservatively and thus they are excluded. Also in case of very low risk cases, it seems unjustifiable to complete the whole range of physiological parameters like ECG, serum electrolytes etc.

In case of emergency surgery, the POSSUM system appears to be of value as all the parameters are usually completed[20]. The physiologic status is assessed just before the operation or more accurately after full resuscitation. Regarding the operative scores, inter-observer variability is common. For example in assessing the amount of blood loss or degree of peritoneal contamination. Similarly the malignancy scores are usually not complete without the complete staging or histopathologic reports. Keeping in view these shortfalls for the POSSUM, this scoring system

stands valid for risk-adjusted audit for the emergency surgery. Although the literature reports slight over prediction on part of the POSSUM system, the present study negates this trend. The reason might be (i) only emergency surgeries included as opposed to other studies that include both emergency and elective cases and (ii) a slight increased mortality rate although not significantly might reflect the under-provision of the emergency setting in terms of human resource and equipment as compared to international standards. Yet these findings need to be validated by further studies.

CONCLUSION

The POSSUM system is a good risk-adjusted surgical audit tool and can be adopted in our resource-depleted public sector healthcare settings. It is a very good predictor of mortality rates for those who undergo surgery.

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