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Serum Lactate Level as an Indicator for Leakage in Pediatric Intestinal Anastmosis

Thesis

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In General Surgery

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ABSTRACT

Background: Its quite well know that high levels of serum lactic acid correlates with poor general condition and poor surgical outcome. Postoperative elevated serum lactate during the first 24h is associated with morbidity and even mortality in patients undergoing elective abdominal surgeries. In this study we need to compare the effect of fluctuation in serum lactate levels pre and postoperative on particularly instestinal anastmosis healing between elective vs emergency patients.

Objective: This study is designed to identify if high pre-operative lactate levels and post-operative lactate clearance are correlated with high risk of intestinal anatstmotic leakage in pediatrics.

Patients and Methods: This study was prospective observational study; conducted at Ain Shams University Hospital, Pediatrics surgery department and approved by the Ethical Research Committee at our hospital. We enrolled all patients (aged ≤ 14 years old) who were candidates for intestinal surgical anastomoses either elective or emergency. The patients included in our study were admitted post-operative at our department either in the intermediate or intensive care units accordingly. All patients with medical history of chronic kidney disease, liver failure, ICU admission or major surgery within the month prior to our study were excluded from our study.

Results: We enrolled 26 patients in our study who underwent intestinal anastomosis at our Pediatrics Surgery Department during the past six months. We had 7 female patients (26.9%) and 19 male patients (73.1%). The youngest was two-day old and the oldest was 14 years old. We had leakage incidence 38.5% of the studied patients. The cut-off lactate level for incidence of leakage is >1.2 mmol/L for the 0h (Baseline reading), >2 mmol/L for the 6h, >1.4mmol/L for the 12h, >1.1mmol/L for the 18h, >1.3mmol/L for the 24h. The highest sensitivity and specificity are for the reading at 24h that had the highest sum of both sensitivity(90%) and specificity (93.3%) and area under curve (AUC) 0.860. All patients with elevated lactate > 1.4 mmol/L at 12 h had leakage (100% sensitivity) but with only 66.7% specificity.

Conclusion: This study shows that lactate levels during the first 24 hours postoperatively have a predictive value for postoperative intestinal anastomotic leakage after a laparotomy surgery. Serum lactate levels obtained 24 hours postoperatively had the best predictive value to discriminate between patients with and without anastomotic leakage. Although not explanatory by its design, our study demonstrates that elevated postoperative lactate is an ominous sign that should to be addressed by the intensivist. However, further studies are required to indicate which strategies aimed at resolving hyperlactatemia improve postoperative outcomes.

Keywords: Serum lactate level, cut off point, leakage

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Abb.	Full term
AXR	Abdominal X-rays
CRP	C-reactive protein
ELISA	Enzyme-linked immunosorbent assay
FGF-2	Fibroblast growth factor-2
GI	Gastrointestinal
ICG	Indocyanine green
IL-1β	Interleukin-1β
IMA	Inferior mesenteric artery
NIR	Near infrared
PDGF	Platelet-derived growth factor
SIRS	Systemic inflammatory response syndrome
SMA	Superior mesenteric artery
SPSS	Statistical package for social science
TGF- β	Transforming growth factor-β
TNFα	Tumour necrosis factor α
VEGF	Vascular endothelial growth factor
WSCE	Water-soluble contrast enema

INTRODUCTION

Anastomotic leaks are defined as ‘a leak of luminal contents from a surgical join‘. They are the most important complication to recognise following gastrointestinal surgery.

Early management of an anastomotic leak is the key. Delay leads to severe sepsis and progression to multi organ failure and death.

It is important to remember that any patient who is not progressing as expected or who deteriorates after surgery should be considered to have an anastomotic leak until proven otherwise.

The most common clinical features of an anastomotic leak are abdominal pain and fever. They usually present between 3-5 days post-operatively ***(Jhanji et al., 2009).***

Anastmotic healing is a complex multi-factorial cell-mediated process. It depends on several factors such as:-

1- Technical factors: affected by the quality of the OR, surgical tools, surgeon skills and knowledge, good post-operative care giving and tight follow up.

2- Patient-related factors: affected by patient's general condition and his medical and surgical history.

The patient's general condition affects the micro-vascular circulation to a great extent which is the cornerstone of anastomotic healing.

An important adaptive mechanism to survive tissue hypoxia caused by hypoperfusion is anerobic glycolysis and subsequent elevation of blood lactate which is easy to measure ***(De Backer et al., 2009).***

Serum lactate levels dynamic alteration specially during the first day postoperative is of great value to predict post morbidity and mortality. In this article we will study the correlation between lactate levels, lactate clearance time and anastmotic leakage in emergency vs elective patients. assuming that elective patients will have normal baseline serum lactic acid and rapid post operative lactate clearance ***(Antonelli et al., 2006; Vellinga et al., 2010).***