



THE ROLE OF SERUM C -REACTIVE PROTEIN IN EARLY DETECTION OF BOWEL ANASTOMOTIC LEAKAGE

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ABSTRACT This study aims to assess the role of CRP in early detection of bowel anastomotic leak. **Objective:** 1. To establish clinically useful postoperative CRP cut off value at which the safer discharge of the patient can be planned after elective Gastro intestinal surgery (bowel anastomosis) **Methods:** This study was conducted in Department of General Surgery in King George Hospital Visakhapatnam from April.2021 to March 2022. Serum CRP levels in patients undergoing elective abdominal surgery with a primary anastomosis was measured preoperatively and on post-operative day 4 for a total of 113 patients. All patients were followed up for 15 days for development of an anastomotic leak. The CRP values obtained were analyzed by receiver operator curve analysis to assess the diagnostic accuracy of a day 4 CRP value as an early detector of anastomotic leak. **Results:** Anastomotic leakage will be diagnosed as per standard treating unit protocols. The cut-off value of day 4 CRP with highest area under the curve in the receiver operator curve analysis was calculated and found to be 166mg/L. Bivariate analyses carried out between the occurrence of leak occurrence and sex, type of disease, approach of surgery, type of surgical procedure, level of anastomosis, stapled vs handsewn, curative vs palliative were not significant as assessed by Chi square tests. An elevated CRP on day 4 above 166mg/L is a sensitive and specific marker for early detection of a bowel anastomotic leak. **Conclusions:** From the above study it can be concluded that a day 4 CRP should be performed for all patients following an elective surgery where bowel anastomosis was done. Based on the data, we recommend that otherwise well patients with a day 4 CRP value less than 166mg/L for open procedures can be safely discharged.

KEYWORDS : c-reactive protein, bowel anastomosis, anastomotic leak, open surgery

Introduction:

- Advancements in surgery have led to a point where the modern surgeon no longer looks upon a gastro intestinal malignancy as an unsurmountable obstacle, fraught with morbidity and looming death.
- But as a challenge to be met, aided with arsenal that modern oncological surgery and chemo-radiation provides.
- Unfortunately, despite such rapid advances in surgery and the wonders of neo-adjuvant chemo-radiation, the specter of anastomotic leaks continues to cast a dark veil over even the best equipped facilities.
- Early detection of post-operative anastomotic leak reduces morbidity and leads to better outcomes following a leak
- One such marker, CRP - C Reactive Protein has shown great promise as both a cost effective, and reliable early marker of anastomotic leak.
- Several studies have proven the role of C- reactive protein as a useful marker of anastomotic healing, with consistently high negative predictive values (>95%), as early as post-operative day 4 onwards.

Review Of Literature:

- C reactive protein is a pentameric molecule of hepatocyte origin and belong to the pentraxin group of plasma proteins, which are calcium dependent ligand binders. Normal levels are usually below 1mg/L, with the 90th percentile being 3mg/L.

Aim:

This study aims to assess the role of CRP in early detection of bowel anastomotic leak.

Objectives

1. To establish clinically useful postoperative CRP cut off value at which the safer discharge of the patient can be planned after elective Gastro intestinal surgery (bowel anastomosis)

Methods:

This study was conducted in Department of General Surgery in King George Hospital Visakhapatnam from April.2021 to March 2022. Serum CRP levels in patients undergoing elective abdominal

surgery with a primary anastomosis was measured preoperatively and on post-operative day 4 for a total of 113 patients. All patients were followed up for 15 days for development of an anastomotic leak..

Study Design:

Prospective Observational Study

Inclusion Criteria:

- All patients who were above the age of 18
- All patient who consented for the procedure.
- Patients undergoing any intestinal anastomosis.

Exclusion Criteria :

- Emergency surgery
- Active infection prior to surgery
- Reexploration/ leak detected before 4th post operative day
- Acute or chronic liver failure
- SLE, dermatomyositis, scleroderma
- Inflammatory bowel disease
- Luekemia

Following investigations were performed:

Cbc
C-Reactive Protein post operatively

Primary Outcome Measure :

- The area under the curve of ROC analysis for post operative day 4 CRP value in relation to anastomotic leak.

Diagnostic criteria:

Any one of the following :

- 1. Luminal or feculent contents in drain or from wound site
- 2. Radiological evidence of anastomotic leak: presence of air or fluid collection in the peri-anastomotic region or intra-abdominal/ pelvic collection or contrast leak from anastomotic site
- 3. Evidence of anastomotic dehiscence on re-exploration

Sample processing:

All CRP measurements were quantified by immunonephelometry (Siemens nephelometer, Siemens AG). The lower limit of the cutoff

was 3.14 mg/L and the upper limit 203 mg/L.

Follow up :

There was a 15 day follow up at minimum for all patients, as documented by postoperative OPD visits and documentation of current clinical status as well as telephonic phone calls if follow up in OPD was not pre Data entry : sent/required

Statistical methods :

- The output from data entry was generated and with PSPP (GNUand analysed by SPSS software, (SPSS, IBM) PSPP, open source).
- The CRP values on day 4 were plotted as an ROC curve with relation to the occurrence of an anastomotic leak.
- The diagnostic accuracy of value of CRP was estimated with this ROC plotting.
- Association between independent continuous covariates were assessed using the MannWhitney U test

Results:

Area under ROC curve	
Area under ROC curve:	0.853
Standard Error	0.043
Z-statistic	8.16
Prob>Z (P-value)	<0.001
Roc curve	
Sample size	113
Positive	22(0.195)
Negative	91(0.805)

Summary

Summary	
Youden index,j:	0.642
Cutoff:	166
Sensitivity:	81.818
Specificity:	82.418

Discussion:

- The most important advantage of CRP is that it allows the treating clinician to make a diagnosis of anastomotic leakage much earlier than what current methods currently available allow.
- In this manner, an elevated Day 4 CRP value acts as early detector of anastomotic leakage

Earlier detection would lead to:

- Earlier cross sectional imaging
- Earlier initiation of antibiotics
- Faster decision on need to post for surgery
- Overall improved outcomes from prevention of overt sepsis

postoperative day 4 CRP value offers 3 other advantages:

1. An objective non biased independent measure of leak
2. probability Increases the positive predictive value of cross sectional imaging when used as CRP, first approach
3. A negative predictive value index to facilitate safe discharge.

Therefore, it was decided to hold to the 166 mg/L value as an appropriate level to decide continued admission.

At this level, the negative predictive value was . 93.8%.

Limitations:

- we had initially attempted to blind the treating team from the CRP values, but in several cases blinding was not adequate.
- We did not consider different approaches of surgery in relation to level of CRP at which bowel anastomosis leakage occurs.
- We did not specify the type of anastomosis .

Conclusion:

- We advise that a day 4 CRP be performed for all patients following an elective gastrointestinal anastomotic procedure.
- The role of CRP in Gastro intestinal surgery lies in its ability as an early detector of anastomotic leak, thus ensuring early intervention.
- This would reduce the morbidity and mortality associated with delayed detection.

- Based on our data, we recommend that otherwise well patients with serum CRP value less than 166mg/L on day 4 can be safely discharged.

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