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## Procalcitonin (PCT) level as a biomarker of post operative complication after major gastrointestinal Surgery: Comparable or better than c-reactive protein (CRP)

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### Abstract

C-reactive protein (CRP) has been announced as a new biomarkers parameter of post operative complication and already been used widely in the routine clinical practice although it might be could not supported in the tertiary hospital especially in the developing countries. Early studies reported the sensitivity and specificity of the CRP level is a better prognostic factor than WBC level alone in predicting the post operative morbidity after major gastrointestinal surgery.

Anastomosis leak was reported in 7 to 10% of resection during major gastrointestinal surgery (resection of colorectal cancer). In the early phase of anastomosis leak, clinical finding usually could not specific enough in diagnosed this complication and sometimes has been misdiagnosed as post operative pain. Nowadays, there are many biomarkers has been announced as post operative complication parameter, one of the promising biomarker is procalcitonin (PCT).

**Keywords:** Procalcitonin, PCT, biomarker, CRP

### Introduction

Bacterial infection is the most common complication during major gastrointestinal surgery in the acute care setting, lead to increasing post operative morbidity and also mortality rate if has not been recognized and diagnosed as early as possible. Clinical parameter is the important things to diagnosed this complication <sup>[1]</sup>. In some condition, early post operative complication or morbidity was not as easy to be diagnosed by the clinician and the intensive care team. White blood count (WBC) was no longer been used as the only parameter of post operative complication after major gastrointestinal surgery such as colorectal resection, upper gastrointestinal cancer surgery, pancreatic procedure for complicated acute pancreatitis. Current data reported no correlation between WBC level and post operative possibilities after major surgery especially in the elective setting and was not correlated with the early phase of post operative morbidity <sup>[2]</sup>.

More than two decades ago, C-reactive protein (CRP) has been announced as a new biomarkers parameter of post operative complication and already been used widely in the routine clinical practice although it might be could not supported in the tertiary hospital especially in the developing countries. Early studies reported the sensitivity and specificity of the CRP level is a better prognostic factor than WBC level alone in predicting the post operative morbidity after major gastrointestinal surgery. Post operative CRP level measurement was effective on follow up evaluation, the lower CRP level was associated with favorable clinical outcome after surgery <sup>[1, 3]</sup>.

One of the common bacterial associated complication is leak of the anastomosis, the incidence is varies between studies and type of resection. Anastomosis leak was reported in 7 to 10% of resection during major gastrointestinal surgery (resection of colorectal cancer). In the early phase of anastomosis leak, clinical finding usually could not specific enough in diagnosed this complication and sometimes has been misdiagnosed as post operative pain. Nowadays, there are many biomarkers has been announced as post operative complication parameter, one of the promising biomarker is procalcitonin (PCT). This kind of biomarker has an important role in detecting the intra abdominal infection, severe inflammation and intra abdominal sepsis as a

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response of systemic process [4].

Procalcitonin was known as a 116 amino acid polypeptide with prohormone of calcitonin, it has an important role on diagnosing the bacterial infection especially in complicated intra abdominal infection (cIAI). (3) Primarily it was synthesized by the C cells of the thyroid gland and other organs such as gastrointestinal tract and the lungs. The productions of this biomarker was stimulated by the proinflammatory cytokines, endotoxemia by bacteria makes the procalcitonin level increasing in the blood. A meta-analysis study reported by Wirz Y et al, explained the role of procalcitonin biomarker in reducing the use of antibiotics in the intensive care setting patients. There was not only reducing the demand of the antibiotics use, but also reducing the over treatment of critically ill patients which not always need prolonged antibiotics therapy [4, 6].

Major gastrointestinal surgery such as colorectal cancer resection (open technique and minimally invasive technique), pancreatic surgery for severe acute pancreatitis (correlated with biliary stones), secondary bacterial peritonitis has many post operative complication and morbidity including post operative bacterial infection which sometimes was no too easy to be diagnosed by clinical finding only, especially in early phase of post operative period and could be delayed or misdiagnosed with will be given the unfavorable outcome of the patients [5, 6].

Radiology examination like abdominal ultrasound (US) or computerized tomography (CT) scanning has an important role on diagnosed the intra abdominal post operative bacterial infection by evaluating the presence of intra abdominal fluid collection, but it would be so confusing when it was compared with sterile post operative fluid collection intra abdominally. The delayed of the diagnosis has been made, the poor outcome will be found later because depend only on clinical signs or symptoms might be atypical and might be results in delayed management [6].

Antimicrobial usage and antimicrobial resistance is the main issue in treating complicated intra abdominal infection associated with major gastrointestinal surgery, the unreasonable usage of the antimicrobial has been reported lead to increasing of the resistences of them. Nowadays, as one of biomarker, post operative evaluation of procalcitonin has been reported play an important role on deciding when to stop the routine use of antimicrobial which has an impact of decreasing of the progression of these resistance and has a better sensitivity-specificity rate than other biomarkers including CRP in many type of major gastrointestinal surgery [7, 8].

A systematic review by Kamat IS, *et al*, reported the effectiveness of procalcitonin biomarker to differentiate between viral and bacterial infection, so the reasonable usage of antimicrobial could be achieved and the patients safety could be maintain in our clinical practice [9].

It is our clinical judgement on deciding which biomarker will be used as our routine examination especially in high risk patients with major gastrointestinal surgery.

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