

First Week Post-Operative C-Reactive Protein Kinetics Show Different Patterns of Association with Infection Depending on the Type of Surgery

BACKGROUND

C-reactive protein (CRP) is a non-specific marker of inflammation and due to surgery alone, CRP levels are increased post-operatively. Although multiple studies investigated the potential of post-operative CRP levels to predict post-operative infection, its discriminative capacity remained unclear. This 'big data' study describes the post-operative CRP-kinetics and clinical potential in distinguishing between patients with and without a post-operative infection.

METHODS

Inclusion

- Pre-operative CRP <25mg/L
- ≥ 1 CRP measurement within 30 days post-operative

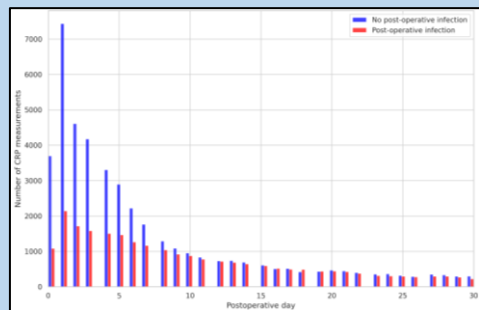
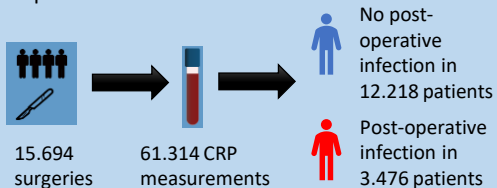


Figure 1. Total number of CRP measurements in the postoperative period for patients with and without an infection.

MAIN RESULTS

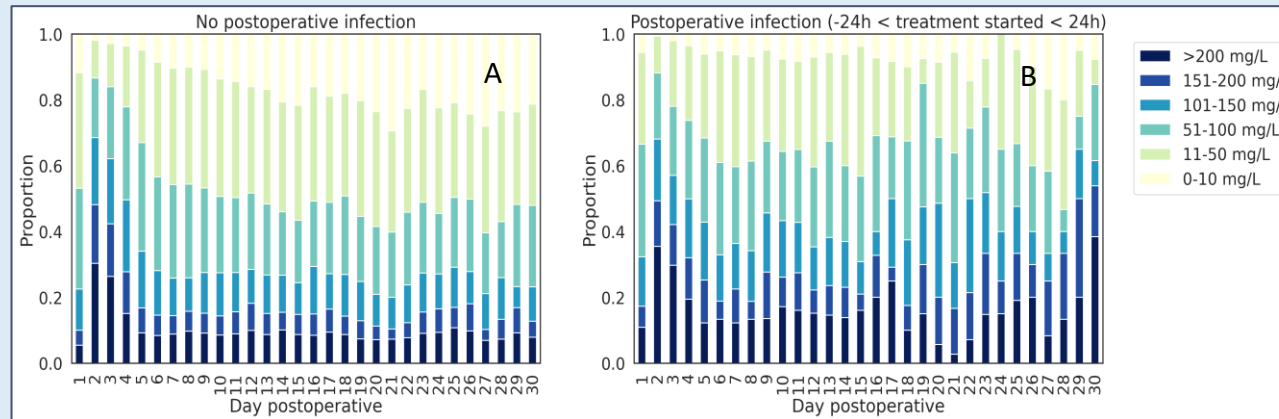


Figure 2. Proportion of CRP measurements for patients with or without a postoperative infection per level of CRP.

Panel A (left figure): measurements for patients that had no infection within 30 days post-operative.

Panel B (right figure): only measurements for patients from whom the CRP measurement was in the 24 hours before or after the treatment was started.

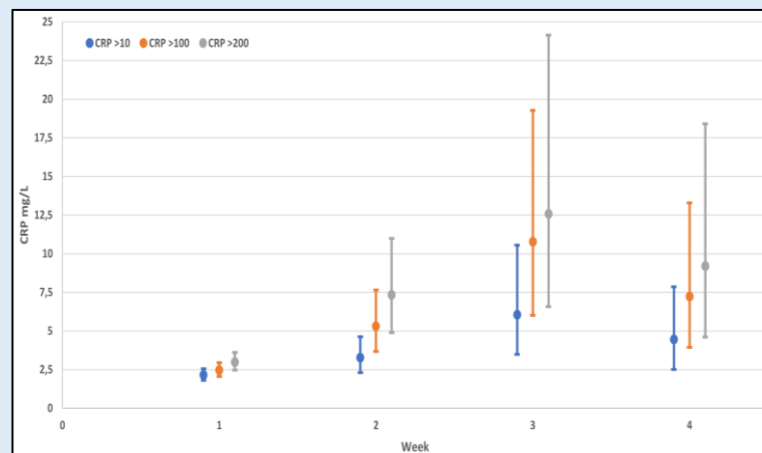


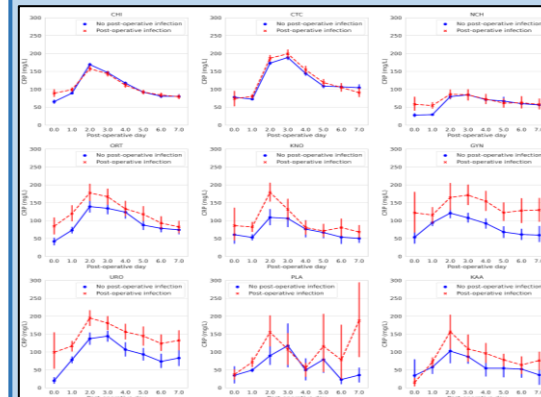
Figure 3. Odds ratio for presence of post-operative infection in patients with a CRP >10, >100 or >200 compared to patients with a CRP <10

	Procedures with POI (n = 3.476)	Procedures without POI (n = 12.218)	Sens (%)	Spec (%)	PPV (%)	NPV (%)
CRP>100						
1 st week	1277	4923	90%	22%	21%	90%
2 nd week	226	614	86%	46%	27%	94%
3 rd week	89	287	86%	63%	24%	97%
4 th week	55	249	80%	65%	18%	97%
CRP >200						
1 st week	677	2150	92%	40%	24%	90%
2 nd week	112	220	75%	71%	34%	94%
3 rd week	37	102	73%	83%	27%	97%
4 th week	25	89	64%	34%	22%	97%

Legend: CRP, C-reactive protein; POI, postoperative infection; OR, odd ratio; sens, sensitivity; spec, specificity; PPV, positive predicted value; NPV, negative predicted value.

Table 1. Comparison of CRP values in patients with and without post-operative infections.

SURGICAL SUBSPECIALTIES



CONCLUSION

CRP is not measured in all post-operative patients, indicating there is probably a reason to measure CRP post-operatively and that missing CRP values are not missing at random. Nevertheless, these results are corresponding to the current clinical daily practice. When measured, CRP is most often measured in the first week post-operatively. However, these first week CRP levels are similar in post-operative patients with and without an infection, which is probably due to the surgical intervention itself. After the first post-operative week differences develop in CRP levels between patients with and without an infection, but how they differ depends, in part, on the type of surgery. CRP is strongly associated with postoperative infections, but as standalone biomarker it has a low PPV and reasonable NPV. Hence, CRP measurements in the first week are of limited to no use for differentiating between patients with- and without a post-operative infection. After this first week, CRP measurements seem to add, in addition to clinical status of the patient and other diagnostic measurements or procedures.