

## ORIGINAL ARTICLE

### Evaluation of hCRP level in patients with orthopaedic implant surgery

<sup>1</sup>T L Narshimha Reddy, <sup>2</sup>Badika Gautham Kumar Raja

<sup>1,2</sup>Associate Professor, Department of Orthopaedics, Dr Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinaoutpalli, Krishna Dist, Andhra Pradesh, India

#### ABSTRACT:

**Background:** Orthopaedics deals with all type of bone diseases. CRP levels may increase under several conditions in addition to infection, such as trauma, surgery, burns, tissue necrosis, immunologically mediated inflammatory diseases, and advanced cancer. The present study was conducted to assess hCRP level in patients with orthopaedic implant surgery. **Materials & Methods:** 70 patients of orthopaedic implant surgery of both genders were selected and the venous blood samples were taken to measure the level of hsCRP pre-operatively before the surgery and then at 2 weeks, 4 weeks and 6 weeks after surgery. **Results:** Out of 70 patients, males were 38 and females were 32. Implants used in orthopaedic surgeries were DTLP in 25 females, PFN in 10, malleolar screw 18, bipolar hemi art in 7, BDCP in 6 and flexi nail 4 patients. The difference was significant ( $P < 0.05$ ). The mean hCRP level pre-operatively was 15.4 mg/dl, at 2 weeks was 126.8 mg/dl, at 4 weeks was 76.3 mg/dl and at 6 weeks was 12.1 mg/dl. The difference was significant ( $P < 0.05$ ). **Conclusion:** The level of hCRP level decreased gradually following orthopaedic implant surgery.

**Key words:** Orthopaedic implant surgery, Osteoarthritis, hCRP

**Corresponding author:** Badika Gautham Kumar Raja, Associate Professor, Department of Orthopaedics, Dr Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Chinaoutpalli, Krishna Dist, Andhra Pradesh, India

**This article may be cited as:** Reddy TLN, Raja BGK. Evaluation of hCRP level in patients with orthopaedic implant surgery. *J Adv Med Dent Sci Res* 2015;3(2):257-259.

#### INTRODUCTION

Orthopaedics deals with all type of bone diseases. The major surgeries which are done are knee replacement, fractures involving different bones etc.<sup>1</sup>Osteoarthritis (OA) is the most common type of arthritis, affecting nearly 27 million Americans or 12% of adults in the United States. By the year 2030, this number is expected to reach 72 million or about 20% of the adult US population. The combined annual cost of medical care and lost wages due to OA is expected to approach US\$100 billion by the year 2020.<sup>2</sup>The elevated level of the CRP can be a rationale for delaying surgery and is used as one of the diagnostic criteria of PJI after surgery.<sup>3</sup>Serum C-reactive protein (CRP) level is generally used as a screening test for infection because it is simple, cost-effective, and highly sensitive.<sup>4</sup>

However, the main problem with the CRP level test is that it has low specificity. For example, CRP levels may increase under several conditions in addition to infection, such as trauma, surgery, burns, tissue necrosis, immunologically mediated inflammatory diseases, and advanced cancer.<sup>5</sup> Moreover, other clinical situations such as vigorous exercise, and even some psychiatric diseases, are associated with mild

CRP changes.<sup>6</sup> In addition, a definite threshold level of CRP required for diagnosing infection is clearly not defined, and the reported results vary. Moreover, the sensitivity and specificity for diagnosing infections depend on different CRP threshold levels under different conditions.<sup>7</sup>The present study was conducted to assess hCRP level in patients with orthopaedic implant surgery.

#### MATERIALS & METHODS

The present study comprised of 70 patients who underwent orthopaedic implant surgery of both genders. All enrolled patients were informed and written consent was obtained.

Demographic data such as name, age, gender etc. was recorded. All patients were planned for implant surgery. Laboratory investigations such as complete blood count, haemoglobin, CT, BT, viral markers were performed. Venous blood samples were taken pre and post operatively from all patients. The level of hsCRP was evaluated pre-operatively before the surgery and then at 2 weeks, 4 weeks and 6 weeks after surgery. Data thus obtained were subjected to statistical analysis. P value  $< 0.05$  was considered significant.

#### RESULTS

**Table I Distribution of patients**

Total-70		
Gender	Males	Females
Number	38	32

Table I shows that out of 70 patients, males were 38 and females were 32.

**Table II Type of implant used in surgery**

Implants	Number	P value
DTLP	25	0.04
PFN	10	
Malleolar screw	18	
Bipolar hemi art	7	
BDCP	6	
Flexi nail	4	

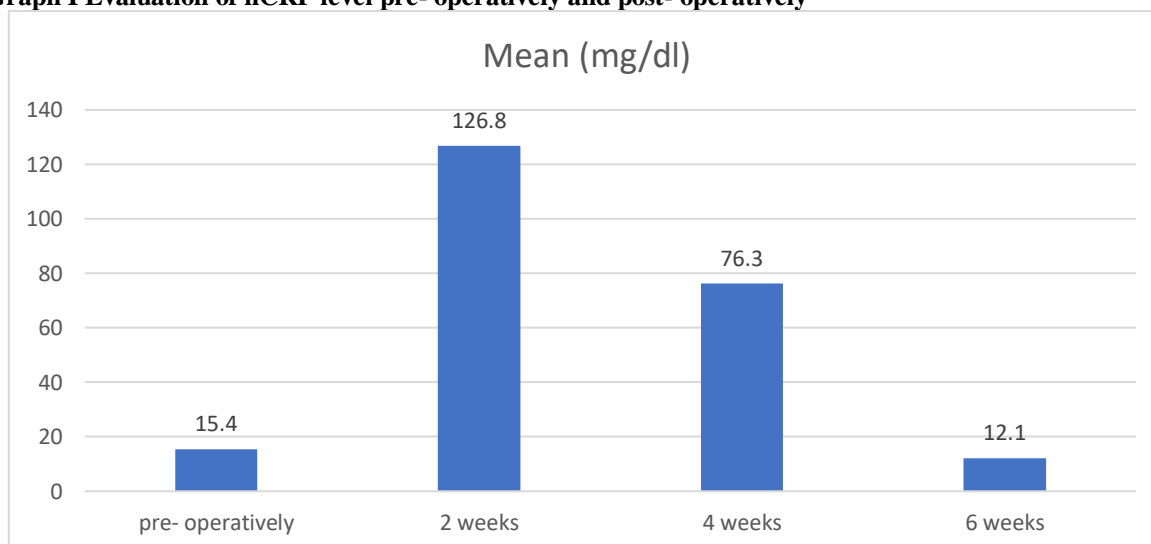
Table II shows that implants used in orthopaedic surgeries were DTLP in 25 females, PFN in 10, malleolar screw 18, bipolar hemi art in 7, BDCP in 6 and flexi nail 4 patients. The difference was significant ( $P < 0.05$ ).

**Table III Evaluation of hCRP level pre- operatively and post- operatively**

Period	Mean (mg/dl)	P value
pre- operatively	15.4	0.01
2 weeks	126.8	
4 weeks	76.3	
6 weeks	12.1	

Table III, graph I shows that mean hCRP level pre- operatively was 15.4 mg/dl, at 2 weeks was 126.8 mg/dl, at 4 weeks was 76.3 mg/dl and at 6 weeks was 12.1 mg/dl. The difference was significant ( $P < 0.05$ ).

**Graph I Evaluation of hCRP level pre- operatively and post- operatively**



**DISCUSSION**

Various North-American and European studies have shown that the CRP level increases significantly on the 2nd postoperative day and it decreases from a peak on the 2nd postoperative day, returning to normal value 6 to 8 weeks after operation.<sup>8,9</sup>The present study was conducted to assess hCRP level in patients with orthopaedic implant surgery.

We found that out of 70 patients, males were 38 and females were 32. Larsson et al<sup>10</sup> in their study the levels of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were determined by serial measurements after four types of uncomplicated elective orthopaedic surgery. The type of operations chosen for this study were total hip arthroplasty (primary, n = 109; and revisions caused by aseptic loosening, n = 9), unicondylar knee arthroplasty (n = 39), and lumbar microdiscectomy (n = 36). In all patients, CRP levels increased after surgery, reaching peak levels on the third day after hip arthroplasties

(primary, 116 +/- 43 mg/l; revisions, 136 +/- 58 mg/l) and on the second day after knee arthroplasties (140 +/- 46 mg/l) and lumbar microdiscectomy (48 +/- 27 mg/l). C-reactive protein levels usually dropped to normal (less than 10 mg/l) within 21 days after surgery. No correlations were found between CRP response and the type of anesthesia, amount of bleeding, transfusion, operation time, administered drugs, age, or gender. Erythrocyte sedimentation rate increased to peak levels about five days after surgery, followed by a slow and irregular decrease. Still, 42 days after uncomplicated operations ESR often remained elevated. In conclusion, the level of CRP must be considered a better diagnostic aid for the early detection of postoperative infections than ESR. It can be assumed that the rapid decline in CRP after uncomplicated orthopedic surgery will be interrupted by a second rise or by a persisting elevated level if infectious complications occur.

We found that implants used in orthopaedic surgeries were DTLP in 25 females, PFN in 10, malleolar screw 18, bipolar hemi art in 7, BDCP in 6 and flexi nail 4 patients. Mehrotra et al<sup>11</sup> assessed the hs CRP levels in orthopedic implant surgery in 58 patients requiring orthopaedic implant surgery. Age group 20-40 years had 10 males and 8 females, 40-60 years had 14 males and 11 females and >60 years had 8 males and 57 females. Commonly used implants were DTLP in 25 patients, PFN in 10, Malleolar screw in 6, BDCP in 4, bipolar hemi art in 5, flexi nail in 3 and clavicle in 5. The difference was significant ( $P < 0.05$ ). 1 day before hSCRp level (mg/Dl) in males 1 day before surgery was 14 and 13 in females. After 2 weeks, it was 134 and 145 in males and females respectively. After 4 weeks, it was 86 and 62 in males and females respectively. After 6 weeks, it was 12 and 11 in males and females respectively.

We found that the mean hCRP pre-operatively was 15.4 mg/dl, at 2 weeks was 126.8 mg/dl, at 4 weeks was 76.3 mg/dl and at 6 weeks was 12.1 mg/dl. Smith et al<sup>12</sup> investigated the relationship between serum high-sensitivity C-reactive protein (hs-CRP) and functional outcomes post-TKA in 31 patients with osteoarthritis (OA). Mean  $\pm$  standard deviation (SD) baseline and 1-year hs-CRP values for the low hsCRP group were  $0.55 \pm 0.23$  mg/l and  $1.22 \pm 1.32$  mg/l, respectively ( $n = 15$ ;  $p = 0.051$ ) and for the high hs-CRP group were  $7.86 \pm 5.98$  mg/l and  $14.11 \pm 38.9$  mg/l, respectively ( $n = 13$ ;  $p = 0.54$ ). Lymphocytes were present in 10 synovium and one bone sample (all but one from high hs-CRP group). Interleukin (IL)-5 and IL-10 were significantly correlated with hs-CRP ( $p = 0.0137$  and  $p = 0.0029$ , respectively). The low hs-CRP group exhibited significant improvement in the physical component of SF-12 at 6 and 12 months compared with baseline, whereas the high hs-CRP group exhibited significant improvement only at 6 months. Body mass index (BMI) had a significant positive correlation with presurgical hs-CRP.

## CONCLUSION

Authors found that the level of hCRP level decreased gradually following orthopaedic implant surgery.

## REFERENCES

1. Povoja P. C-reactive protein: a valuable marker of sepsis. *Intensive Care Med* 2002;28:235.
2. Piper KE, Fernandez-Sampedro M, Steckelberg KE, et al. C-reactive protein, erythrocyte sedimentation rate and orthopedic implant infection. *PLoS One* 2010;5:9358.
3. Dupont C, Rodenbach J, Flachaire E. The value of C-reactive protein for postoperative monitoring of lower limb arthroplasty. *Ann Readapt Med Phys* 2008;51:348.
4. Sastre S, Soriano A, Garcia S. Serum C-reactive protein as predictor of infected arthroplasty. *Eur J OrthopSurgTraumatol* 2006;16:17.
5. Alijanipour P, Bakhshi H, Parvizi J. Diagnosis of periprosthetic joint infection. *Clin OrthopRelat Res* 2013;471:3186.
6. Johnson AJ, Zywiol MG, Stroh A, et al. Serological markers can lead to false negative diagnoses of periprosthetic infections following total knee arthroplasty. *Int Orthop* 2011;35:1621.
7. Niskanen RO, Korkala O, Pammo H, et al. Serum C-reactive protein levels after total hip and knee arthroplasty. *J Bone Joint Surg* 1996;78-B:431.
8. White J, Kelly M, Dunsmuir R. C-reactive protein level after total hip and total knee replacement. *J Bone Joint Surg Br* 1998;80:909.
9. Suh Y-S, Choi H-S, Nho J-H, et al. Prediction of early postoperative infection after arthroplasty using the C-reactive protein level. *J Korean Orthop Assoc* 2012; 47:133.
10. Larsson SU, Thelander U, Friberg SV. C-reactive protein (CRP) levels after elective orthopaedic surgery. *Clinical orthopaedics and related research*. 1992 Feb 1(275):237-42.
11. Mehrotra S. Role of hs CRP level in orthopedic implant surgery- A clinical study. *J Adv Med Dent Scie Res* 2014;2(3):253-256.
12. Smith JW, Martins TB, Gopez E, Johnson T, Hill HR, Rosenberg TD. Significance of C-reactive protein in osteoarthritis and total knee arthroplasty outcomes. *Therapeutic advances in musculoskeletal disease*. 2012 Oct;4(5):315-25.