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Original Research

Evaluation of hsCRP level before and after orthopedic implant surgery- A clinical study

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ABSTRACT

Background: 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. The present study assessed hsCRP level in patients with orthopedic implant surgery. **Materials & Methods:** Study comprised of 72 patients who underwent orthopaedic implant surgery. Blood samples of all patients were taken both pre- and post-operatively. The level of hsCRP was determined 1 day prior to the surgery and then at 2 weeks, 4 weeks and 6 weeks after surgery. **Results:** ASA grade I was seen in 20 males and 14 females, grade II in 14 males and 10 females and grade III in 8 males and 6 females. The implants used were malleolar screw 8 in males and 4 in females, bipolar hemi art 6 in males and 2 in females, DTLP 10 in males and 9 in females, PFN 8 in males and 5 in females, BDCP 6 in males and 7 in females and flexi nail 4 in males and 3 in females. The mean hsCRP level (mg/dl) in males 1 day before surgery was 16.4, at 2 weeks was 132.4, at 4 weeks was 78 and at 6 weeks was 12.3. In females, mean hsCRP level (mg/dl) in females 1 day before surgery was 12.8, at 2 weeks was 146.2, at 4 weeks was 64 and at 6 weeks was 10.4. The difference was significant (P< 0.05). **Conclusion:** Both genders experienced decrease in hsCRP level following orthopaedic implant surgery.

Key words: orthopedic implant surgery, hsCRP, malleolar screw.

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INTRODUCTION

Postoperative wound infections (POWI) form one of the biggest challenges in orthopedic (trauma) surgery (OTS).[1] It is estimated that POWI's occur in 1-7% of all arthroplasty patients and in approximately 3.3 % of patients following internal fixation for fracture treatment.[2] Early diagnosis of POWI's can be challenging, laboratory tests however may reveal POWI's and other complications before clinical signs become apparent. Examples of these tests are Erythrocyte Sedimentation Rate (ESR), Leukocyte count and C-Reactive Protein (CRP).[3]

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. However, the level of preoperative CRP can be elevated in various clinical situations, such as concomitant cardiac disease, even if there is no obvious infection.[4] A rise in CRP levels can be the result of a wide array of conditions, including local and general infections, and also tissue damage. An increase of CRP is a physiological phenomenon afterr surgical interventions, and its magnitude depends on the amount of surgical trauma. CRP levels may be also elevated by default in patients with underlying infections or systemic diseases, such as rheumatoid arthritis.[5]

If the CRP elevation is caused by the reasons other than infectious conditions, TKA does not need to be delayed. On the other hand, an elevated preoperative baseline value of CRP can affect the temporal change patterns of inflammatory markers including CRP and erythrocyte sedimentation rate (ESR) after surgery. This may cause confusion during the follow up after surgery concerning whether additional diagnostic

procedures are needed.[6] The present study assessed hsCRP level in patients with orthopedic implant surgery.

MATERIALS & METHODS

The present study was conducted among 72 patients who underwent orthopedic implant surgery. 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. Blood investigations such as complete blood count, hemoglobin, CT, BT, viral markers were done. Blood samples of all patients were taken both pre and post operatively. The level of hsCRP was determined 1 day prior to the surgery and then at 2 weeks, 4 weeks and 6 weeks after surgery. Results were subjected to Mann Whitney U test. The level of significance was set below 0.05.

RESULTS

Table I Distribution of patients

Total- 72		
Gender	**Males**	**Females**
Number	42	30

Table I shows that out of 72 patients, males were 42 and females were 30.

Table II Assessment of ASA grade

ASA grade	Males	Females	P value
Grade I	20	14	0.12
Grade II	14	10	
Grade III	8	6	

Table II, graph I shows that ASA grade I was seen in 20 males and 14 females, grade II in 14 males and 10 females and grade III in 8 males and 6 females. The difference was non- significant (P> 0.05).

Graph I Assessment of ASA grade

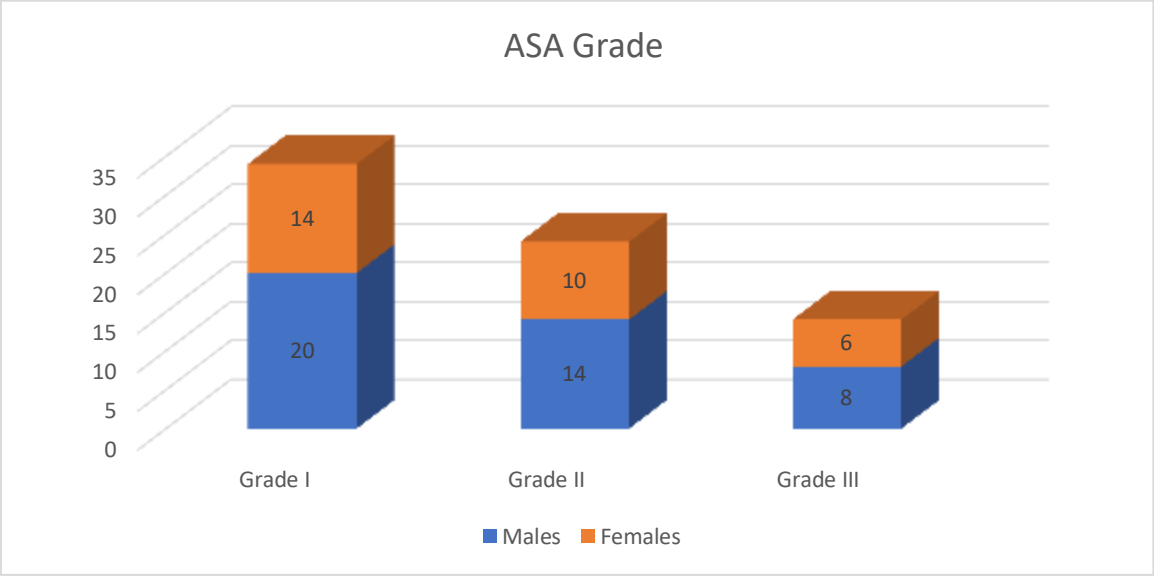

Table III Type of implant used

Implants	Males	Females	P value
Malleolar screw	8	4	0.15
Bipolar hemi art	6	2	
DTLP	10	9	
PFN	8	5	
BDCP	6	7	
Flexi nail	4	3	
Total	42	30	

Table III shows that implants used were malleolar screw 8 in males and 4 in females, bipolar hemi art 6 in males and 2 in females, DTLP 10 in males and 9 in females, PFN 8 in males and 5 in females, BDCP 6 in males and 7 in females and flexi nail 4 in males and 3 in females. The difference was non- significant (P> 0.05).

Table IV hsCRP level in patients

Gender	1 day before	2 weeks	4 weeks	6 weeks	P value
Males	16.4	132.4	78	12.3	0.01
Females	12.8	146.2	64	10.4	0.01

Table IV shows t mean hsCRP level (mg/dl) in males 1 day before surgery was 16.4, at 2 weeks was 132.4, at 4 weeks was 78 and at 6 weeks was 12.3. In females, mean hsCRP level (mg/dl) in females 1 day before surgery was 12.8, at 2 weeks was 146.2, at 4 weeks was 64 and at 6 weeks was 10.4. The difference was significant (P< 0.05).

DISCUSSION

C-reactive protein (CRP) is an annular (ring-shaped), pentameric protein found in blood plasma, whose circulating concentrations rise in response to inflammation.[7] It is an acute-phase protein of hepatic origin that increases following interleukin-6 secretion by macrophages and T cells.[8] The macrophages are present in the bone and bone marrow and less commonly exist in the skeletal muscle. The bone and bone marrow injury happening during TKR can cause elevation of CRP. TKR is more traumatic than total hip replacement and more likely to induce CRP elevation.[9] 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.[10] The present study assessed hsCRP level in patients with orthopedic implant surgery.

In present study, out of 72 patients, males were 42 and females were 30. ASA grade I was seen in 20 males and 14 females, grade II in 14 males and 10 females and grade III in 8 males and 6 females. Mehrotra et al[11] evaluated the hs CRP levels in orthopedic implant surgery in 58 patients requiring orthopedic 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 implants used were malleolar screw 8 in males and 4 in females, bipolar hemi art 6 in males and 2 in females, DTLP 10 in males and 9 in females, PFN 8 in males and 5 in females, BDCP 6 in males and 7 in females and flexi nail 4 in males and 3 in females. The mean hsCRP level (mg/dl) in males 1 day before surgery was 16.4, at 2 weeks was 132.4, at 4 weeks was 78 and at 6 weeks was 12.3. In females, mean hsCRP level (mg/dl) in females 1 day before surgery was 12.8, at 2 weeks was 146.2, at 4 weeks was 64 and at 6 weeks was 10.4. Londhe et al[12] in their study 50 patients (all females, 25 received unilateral operations and 25 bilateral ones) were included. CRP levels were measured, on the 2nd day, 8, 12 and 16 weeks after operation. In both groups, CRP level rose the 2nd post-operative day. The rise in CRP level was significantly higher in the simultaneous bilateral TKR group than in the unilateral TKR group. In unilateral cases, CRP on the 2nd postoperative day ranged from 65 to 110 mg/l with average level of 80 mg/ml. In bilateral TKR cases, CRP level on the 2nd postoperative day was between 110 and 180 mg/l with a mean of 140 mg/ml. The CRP level returned to normal in about 40% of unilateral TKR patients 8 weeks after operation, while in 92% (23 out of 25) of bilateral simultaneous TKR patients it stayed at a high level 8 weeks post-op and did not come back to normal. At 12 weeks CRP decreased to normal in all 100% of unilateral TKR patients and 32% of bilateral TKR patients. At 16 weeks, CRP was normal in all bilateral TKR patients.

CONCLUSION

Present study observed that both genders experienced decrease in hsCRP level following orthopaedic implant surgery.

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