LETTER TO THE EDITOR

The role of omega-3 fatty acids in modulating inflammatory response after surgery

El papel de los acidos grasos omega-3 en la modulación de la respuesta inflamatoria despues de cirugía

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To the editor:

Surgical trauma induces an immunological response, characterized by the activation of cytokines during the post-operative period. Cytokines play a crucial role in coordinating the inflammatory response at the injury site, aiding the wound healing process. However, excessive cytokine production can lead to systemic effects, potentially causing complications and mortality after surgery. Major abdominal surgeries, in particular, can provoke a systemic inflammatory response, leading to significant complications such as organ damage and failure. Numerous studies have highlighted the predictive value of post-operative inflammatory markers for complications and mortality. For instance, higher post-operative interleukin (IL)-6 levels on the 1st day after surgery are significant predictors of post-operative complications[1,2].

Natto et al. in 2014, investigated C-reactive protein (CRP) levels post-major surgeries (cardiac, neuro, vascular, thoracic, or abdominal) in approximately 150 patients, finding that patients with post-operative complications had higher baseline CRP levels. This suggests that reducing post-operative inflammation through anti-inflammatory mechanisms could improve outcomes[3]. Polyunsaturated fatty acids (PUFAs), particularly omega-3 fatty acids, are vital components of cell membranes and precursors for various inflammatory mediators. Omega-3 PUFAs, including α-linolenic acid, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), have been recognized for their immune-modulating properties and potential to reduce chronic inflammation in diseases such as coronary artery disease and diabetes[4].

Research on rodents and humans has demonstrated the anti-inflammatory effects of omega-3 fatty acids, particularly their ability to inhibit IL-6 production by venous endothelial cells in response to endotoxins. For instance, Kiecolt-Glaser et al. found that omega-3 supplementation significantly reduced IL-6 levels in overweight, inactive, middle-aged adults. In addition, Natto et al.'s analysis concluded that omega-3 supplementation was associated with reduced inflammatory markers in individuals with diabetes and cardiovascular diseases[4,5].

EPA and DHA inhibit the production of arachidonic acid (AA)-derived eicosanoids, which regulate inflammation. The EPA/AA ratio influences inflammatory pathways, potentially impacting cancer and chronic inflammatory disorders such as atherosclerosis and cardiovascular disease. Given omega-3 fatty acids' anti-inflammatory properties, their potential benefits in the context of abdominal surgery warrant investigation.

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DHA and EPA reduce inflammation primarily by decreasing eicosanoid synthesis from AA. They compete with AA for incorporation into cell membrane phospholipids, thereby reducing AA availability. This reduction is partly due to the suppression of COX-2 and 5-LOX enzymes, which are involved in AA metabolism. In addition, DHA and EPA inhibit the activation of the proinflammatory transcription factor nuclear factor kappa by preventing the phosphorylation of its inhibitory subunit, I-κB. Furthermore, DHA and EPA promote the synthesis of Resolvin E and D, which possess anti-inflammatory properties by preventing neutrophil migration and IL-1β production[6].

In conclusion, the immunomodulatory effects of omega-3 fatty acids, particularly EPA and DHA, represent a promising area for mitigating post-operative inflammation and improving surgical outcomes. Further research is essential to elucidate their potential benefits in the context of major abdominal surgeries. The integration of omega-3 supplementation into post-operative care protocols could revolutionize our approach to managing inflammation and enhance patient recovery. Despite evidence supporting the anti-inflammatory effects of omega-3 fatty acids, their impact on reducing inflammation after major abdominal surgery remains inconclusive.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

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