IMMUNOLOGICAL CHANGES ASSOCIATED WITH POSTOPERATIVE VENTRAL HERNIA FORMATION AND RECURRENCE

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Relevance:

Despite the variety of techniques for hernia repair and numerous modifications, the number of patients with postoperative ventral hernias (PVH) continues to rise. The causes of PVH formation and recurrence remain incompletely understood. Wound infection rates range from 4–15% after elective hernia repair and reach 35–40% following emergency surgery. Recent studies increasingly highlight the key role of the immune system in the development of local postoperative complications and hernia recurrence. Understanding the immunological changes associated with PVH is essential for optimizing surgical strategies, reducing postoperative complications, and improving patient outcomes.

Aim of the Study:

To investigate the characteristics of the immune response in patients with postoperative ventral hernias in order to clarify the pathogenetic mechanisms underlying hernia formation and recurrence.

Materials and Methods:

The study included 103 patients diagnosed with non-strangulated postoperative ventral hernias. Of these, 31 patients (30.1%) were male and 72

(69.9%) were female, with ages ranging from 33 to 65 years. Recurrent hernias were observed in 32 patients (31.1%). In 68 cases (66.0%), hernias developed following emergency laparotomy, while in 35 patients (34.0%) they occurred after elective surgery. Local postoperative complications—including persistent ligature fistulas, abscesses, deep wound infection, and seromas—were documented in 14 patients (13.6%). Adhesive disease of the abdominal cavity was present in 98 patients (95.1%), and obesity was the most frequent comorbidity, observed in 77 patients (74.8%).

Immunological assessment was performed in 28 patients aged 35–55 years and included evaluation of peripheral blood lymphocyte subpopulations and serum levels of interleukin-4 (IL-4) and interferon-γ (IFN-γ). The control group consisted of 30 somatically healthy donors.

Results and Discussion:

Patients with normal body weight exhibited decreased $CD8^+$ lymphocyte levels and increased $CD4^+$ lymphocyte levels. In contrast, patients with obesity showed significantly lower counts of $CD3^+$ and $CD16^+$ lymphocytes and a disrupted $CD4^+/CD8^+$ ratio compared with the control group. Serum IFN-γ levels were slightly elevated in non-obese patients, while obese patients demonstrated significantly higher IFN-γ concentrations relative to controls. IL-4 was detected in 50% of non-obese patients, with levels significantly lower than those observed in healthy individuals.

Low levels of anti-inflammatory cytokines, particularly IL-4, and their reduction below physiological thresholds may reflect an insufficient humoral immune response following surgical intervention and impaired tissue repair processes. This immunological imbalance may contribute to hernia formation after uncomplicated (“clean”) surgeries and increase the risk of adhesion development.

Furthermore, the increased susceptibility to bacterial pathogens appears to be associated with reduced $CD16^+$ cell counts, which are part of the

nonspecific immune defense, along with impaired neutrophil function and disturbances in the humoral immune system. Overall, the reduced cytokine production indicates a state of immunosuppression in $CD4^+$, $CD8^+$, and $CD16^+$ lymphocytes, which are responsible for the synthesis of IFN-γ and IL-4.

Conclusions:

Patients with postoperative ventral hernias exhibit pronounced alterations in cellular and humoral immunity, which are more severe in the presence of concomitant obesity.

The obtained results should be considered during preoperative preparation for hernioplasty and in the postoperative management of patients with postoperative ventral hernias.

Further in-depth investigation of the immune system in hernia patients is essential to clarify the pathogenetic mechanisms of hernia formation and recurrence, adhesion development, and to substantiate the use of immunotropic therapy for the prevention of local and systemic postoperative complications and for the enhancement of reparative processes.

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