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Immune microenvironment of the omentum in appendicitis: a phenotypic perspective in cell populations

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Abstract

Background: The omentum plays a crucial role in managing inflammation and combating infections, particularly in acute appendicitis [1]. This fat-rich fold of the peritoneum contains lymphoid structures known as “Milky Spots”, which house several types of phenotypically and functionally distinct immune cells, including macrophages and lymphocytes, that contribute to its protective function [1,2]. Among these, T cells (CD3+), including helper (CD4+) and cytotoxic (CD8+) subtypes, B cells (CD20+) and macrophages (CD163+), are known to participate in different aspects of immune regulation and response [1,3]. Understanding the specific roles of those cells in the omental tissue can provide a more detailed insight into the nature and dynamics of the inflammatory response orchestrated by the omentum. The omentum's mobility allows it to adhere to and potentially encapsulate necrotic and infected areas, facilitating pathogen clearance and tissue repair [1,3]. This process is particularly relevant in conditions such as surgical wounds, intestinal ulcers and inflamed appendices [1,2]. **Objective:** This study aims to conduct a phenotypic characterization of the immune response in omental samples from three acute appendicitis patient groups: Group I without peritoneal blockage, Group II with peritoneal blockage, and the control Group III without appendicitis. **Methods:** Omentum samples (n = 3 each group) were analyzed through immunohistochemistry to identify macrophages, lymphocytes and lymphocyte subpopulations, using primary antibodies against CD163, CD20, CD3, CD4, and CD8. **Results:** Observations revealed clear distinctions between the studied groups. Groups I and II showed an increased presence of T cells (CD3+, CD4+, CD8+) and B cells (CD20+), as well as macrophages (CD163+), compared to their minimal presence in the control group. Notably, Group II exhibited the highest levels of CD8+ T cells and CD163+ macrophages, while CD3+ and CD4+ T cells were found at moderate levels. **Conclusions:** The results from this study suggest an association between peritoneal blockage and heightened immune cell infiltration. CD8+ T cells play a key role in immune defense against intracellular pathogens, especially viruses and some intracellular bacteria, and tumor surveillance. Their presence in the omentum of appendicitis patients reinforces the organ’s involvement in this inflammatory condition. Also, the high levels of CD163+ macrophages unveil a remodeling response concomitant with a prolonged inflammatory response.

Keywords: milky spots; immunohistochemistry; immune cells

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