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KI-67 EXPRESSION IN EPITHELIAL AND STROMAL CELLS OF DISTAL COLON POLYPS

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Introduction

Colorectal cancer remains a leading cause of cancer mortality worldwide, with most cases arising from benign neoplasms of the colonic mucosa [1,2]. The most common benign neoplasms include tubular adenomas and hyperplastic polyps [3]. Cellular proliferative activity is a key indicator of the biological behavior of such lesions and can serve as an additional criterion for predicting their malignant potential [4]. While Ki-67 is a well-established marker of cellular proliferation [5], data on its expression in stromal cells of distal colon polyps and its correlation with dysplasia grade are limited.

Aim: To evaluate Ki-67 expression in epithelial and stromal cells of distal colon (DC) polyps and its association with histological type and dysplasia grade.

Materials and methods

A histopathological and immunohistochemical (IHC) study was conducted on archival biopsy material from 139 patients aged 22–81 years. Patients were categorized into three groups: tubular adenomas of the distal colon (n=68), hyperplastic polyps of the distal colon (n=56), and normal distal colon mucosa (control group, n=15).

Hematoxylin and eosin (H&E)-stained slides were prepared using standard protocols and examined to assess microscopic architecture and confirm histological types according to the current World Health Organization (WHO) classification [2]. Immunohistochemical examination was performed according to the manufacturer's standard protocols using monoclonal mouse anti-human Ki-67 antibody (clone MIB-1, DAKO, Denmark). Histological and IHC slides were evaluated under an Axio Scope A1 light microscope (Carl Zeiss, Germany). The slides were photographed with a Jenoptik digital camera (Carl Zeiss, Germany) at ×200 magnification in five fields of view per case.

Nuclear Ki-67 expression was quantitatively determined by manual counting of positive nuclei with the Counter tool in Adobe Photoshop CC (2014), expressed as the percentage of positive cells in epithelial and stromal compartments separately. Statistical analysis was performed on a personal computer using the STATISTICA® for Windows 13.0 software (StatSoft Inc., USA, license No. JPZ804I382130ARCN10-J).

Results

In normal distal colon mucosa, Ki-67 expression was low in both epithelial cells [median 23.92% (IQR 15.30–30.40)] and stromal cells [median 2.84% (IQR 0.58 – 5.32)].

Distal colon polyps exhibited significantly higher epithelial Ki-67 expression compared to normal mucosa: tubular adenomas showed the highest levels [median 61.38% (IQR 49.28–70.38)], followed by hyperplastic polyps [median 35.26% (IQR 4.37–45.23)]. In stromal cells, proliferation remained low overall, but was moderately elevated in tubular adenomas [median 10.51% (IQR 1.08–15.57)] compared to hyperplastic polyps [median 2.84% (IQR 0.70–5.45)] and normal mucosa.

Within tubular adenomas, Ki-67 expression increased with dysplasia grade. High-grade dysplasia adenomas demonstrated 34.5% higher expression in epithelial cells and 12.45% higher in stromal cells compared to low-grade dysplasia adenomas.

The association between Ki-67 expression level and dysplasia grade was confirmed using the Goodman–Kruskal gamma correlation, revealing a strong positive correlation in epithelial cells ($\gamma = 0.79$) and a moderate positive correlation in stromal cells ($\gamma = 0.61$) [both $p < 0.001$].

Conclusions

This study demonstrated significantly elevated Ki-67 expression in distal colon polyps compared to normal mucosa, with markedly higher levels in tubular adenomas than in hyperplastic polyps and a progressive increase with advancing dysplasia grade in adenomas (strong correlation in epithelial cells, $\gamma = 0.79$; moderate in stromal cells, $\gamma = 0.61$; both $p < 0.001$). Quantitative assessment of Ki-67 in both epithelial and stromal compartments via standardized immunohistochemistry provides a valuable supplementary tool for evaluating malignant potential in colorectal premalignant lesions and may improve histopathological risk stratification in modern diagnostic practice.

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