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# The clinical significance of pathological studies of congenital intestinal atresia

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**Key words:**
Intestinal atresia;
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GDNF;
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CR

**Abstract**

**Objective:** The purpose of this study was to explore the mechanisms of postoperative intestinal motility disorders in intestinal atresia patients by investigating the expression profiles of proteins, including calretinin (CR), glial-derived neurotrophic factor (GDNF), bone morphogenetic protein 2 (BMP-2), c-kit, α-smooth muscle actin (α-SMA), and S-100 protein; to decipher the correlation between the area of the pathological segment and the alteration of the above 6 proteins; and thereby to provide a clinical specific reference values to determine the removal length for intestinal tract resection.

**Methods:** Immunohistochemistry technique was applied to detect the CR, c-kit, GDNF, BMP-2, α-SMA, and S-100 protein in specimens of atretic, proximal, and distal intestine from 25 cases of intestinal atresia and samples of intestinal walls from 10 non-atresia control specimens. The alteration of the enteric nervous system, nerve growth and its regulatory factors, the interstitial cells of Cajal (ICCs), and the enteric muscle system were examined, with particular attention being paid to pathological changes and the lesion area.

**Results:** The expression of all of the abovementioned 6 proteins in the proximal side of the atresia was significantly lower than in control group. The expression of the abovementioned proteins tended to be higher farther away from the atresia site. The expressions of both GDNF and BMP-2 had returned to normal level at 10 cm proximal to the atresia site, whereas the expressions of CR, c-kit, α-SMA, and S-100 protein only returned to normal at 15 cm proximal to the atresia site. On the distal side, the expression of all 6 markers at 3 cm distal to the atresia site was normal.

**Conclusion:** Pathological deterioration of the myenteric ganglia, nerve growth factor, and ICCs are the causes of intestinal motility disorders after the surgical repair of intestinal atresia. Our data support resecting an intestinal segment extending from 15 cm proximal to 3 cm distal to the atretic segment. In proximal jejunal atresia, when it is not possible to resect 15 cm, we suggest resecting as much of the hypertrophic proximal intestine as possible. Based on our data, we believe this surgical practice could improve postoperative dysmotility in these patients.



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**Table 1** The expressions of the four proteins and the quantitative changes in the ganglia in HE staining.

| Types of tissues | n | Number of ganglia | Expression level | | | Number of ICCs |
|---|---|---|---|---|---|---|
| | | | CR | GDNF | BMP2 | |
| The site of the atresia | 20 | No ganglia | No expression | 0.28 ± 0.12 * | 0.21 ± 0.12 * | 0 |
| 5 cm proximal to the atresia | 5 | Reduced | 0.34 ± 0.03 * | 0.53 ± 0.14 * | 0.60 ± 0.21 * | 0 |
| 8 cm proximal to the atresia | 5 | Reduced | 0.39 ± 0.08 * | 0.74 ± 0.21 * | 0.75 ± 0.15 * | 2.89 ± 0.22 * |
| 10 cm proximal to the atresia | 8 | Nearly normal | 0.78 ± 0.12 * | 1.20 ± 0.11 * | 1.23 ± 0.23 * | 3.98 ± 0.18 * |
| 15 cm proximal to the atresia | 7 | Basically normal | 1.18 ± 0.20 | 1.33 ± 0.22 | 1.25 ± 0.21 | 4.25 ± 0.16 * |
| 3 cm distal to the atresia | 15 | Normal | 1.17 ± 0.26 | 1.28 ± 0.18 | 1.19 ± 0.11 | 5.26 ± 0.25 |
| Control | 10 | Normal | 1.16 ± 0.06 | 1.25 ± 0.09 | 1.21 ± 0.09 | 5.38 ± 0.39 |

Compared with the control group.
* $p < 0.05$.

Congenital intestinal atresia is a common disease in neonatal surgery with a prevalence of approximately 1:1500–1:2000, and a study has shown that this condition is increasing in prevalence [1]. Recently, the survival rate of congenital intestinal atresia has been improved by the development of new surgical techniques, but postoperative intestinal motility disorders remain the most common clinical complication of intestinal atresia and urgently require an effective treatment. The aim of the present study was to characterize clearly the pathological changes of intestinal atresia and the area of abnormal intestine segments and to explore the possible mechanisms of postoperative intestinal motility disorders by conducting immunohistochemical research on the enteric nervous system (ENS), intestinal mesenchymal cells, neurotrophic factors, and enteric muscle system in different segments of the intestinal tract on both sides of the atresia site. This study provided a theoretical reference for the determination of the scope of pathological intestine segments for surgical removal and therefore guided the clinical work.

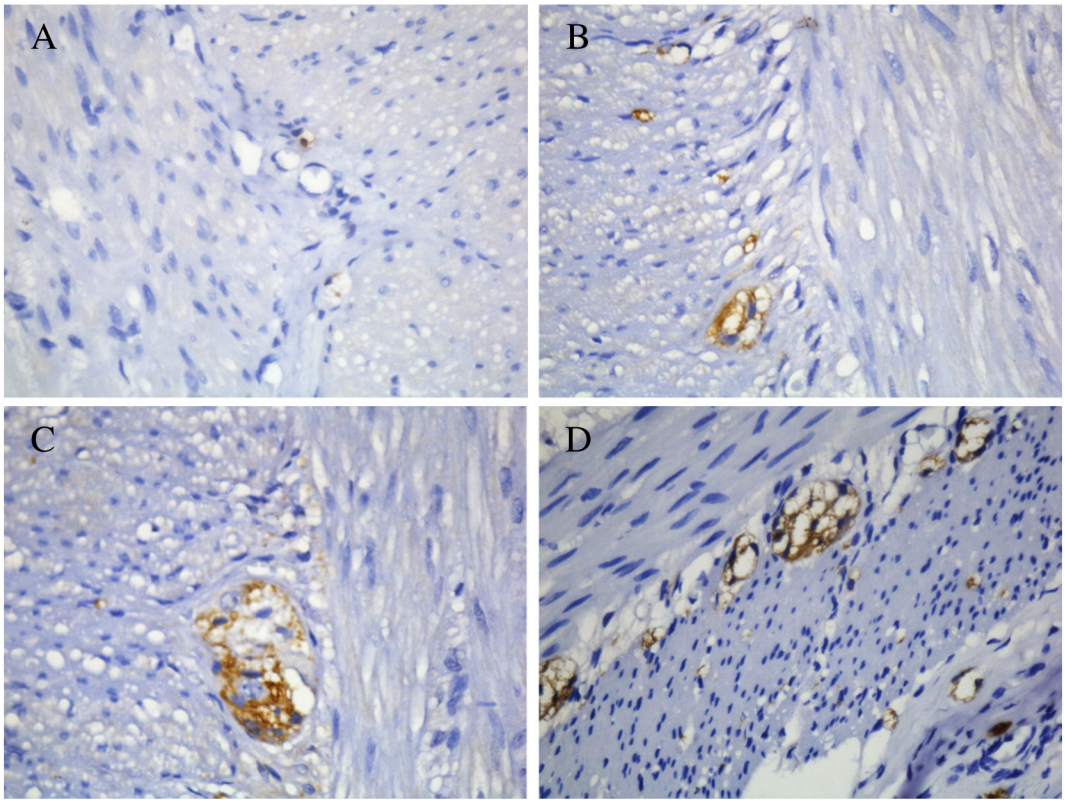


**Fig. 1** CR expression at several intestinal segments proximal to the atresia. (A) CR expression at 5 cm proximal to the atresia. (B) CR expression at 10 cm proximal to the atresia. (C) CR expression at 15 cm proximal to the atresia. (D) CR expression in normal intestinal tract. Immunohistochemistry (400×).