

## EARLY POSTOPERATIVE COLON ELECTRICAL RESPONSE ACTIVITY

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DESPITE CONSIDERABLE overall progress in understanding gastrointestinal electrophysiology, myoelectric activity of the human colon has not been well defined. We investigated colonic myoelectric activity in the early postoperative period in order to better understand the physiology of postoperative ileus.

### MATERIALS AND METHODS

Teflon-coated stainless steel bipolar electrodes were placed in ascending and descending colon of seven patients during laparotomy. Signals were recorded after operation simultaneously by a polygraph (Grass 79) for visual analysis and on magnetic tape (Hewlett-Packard 3968A) for com-

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puter analysis. Recordings began on postoperative (PO) day 1 and continued (4 hr/day) for up to eight consecutive days.

## RESULTS

Several ERA patterns were observed: Type 1—Random action potentials singly and in bursts in both right and left colon present on PO day 1 (3/7 patients) or 2. Type 2—ERA in clusters covering less than 50% of each slow wave (ECA), but occurring on each successive ECA in both right and left colon. Type 2M—Type 2 ERA migrating aborally or orally (velocity 0.8 to 1 cm/min) and occurring only in left colon. Types 2 and 2M ERA appeared on PO day 2 (2/7 patients) or 3. Type 3—ERA in clusters covering greater than 50% of each ECA, and occurring on each successive ECA, in both right and left colon. Type 3M—Type 3 ERA migrating oral or aboral (velocity 1 to 1.6 cm/min) seen only in left colon (Fig 1). Types 3 and 3M ERA appeared after PO day 3. Type 4—Clusters of three or more nonmigrating long ERA bursts (8 to 18 sec) observed in right and left colon after PO day 2. Type 4M—Type 4 ERA, migrating (velocity 1.25 to 2 cm/sec) aborally or orally, in right and left colon after PO day 3 (Fig 2). This activity was frequently associated with complaints of "gas pains" and defecation. Type 5M—Individual long ERA bursts (duration 10 to 20 sec) always migrating aborally (velocity 2.6 to 4 cm/sec) in right and left colon from PO day 4 and often associated with passage of flatus or defecation. Type 5M seemed to signal recovery from functional postoperative ileus.

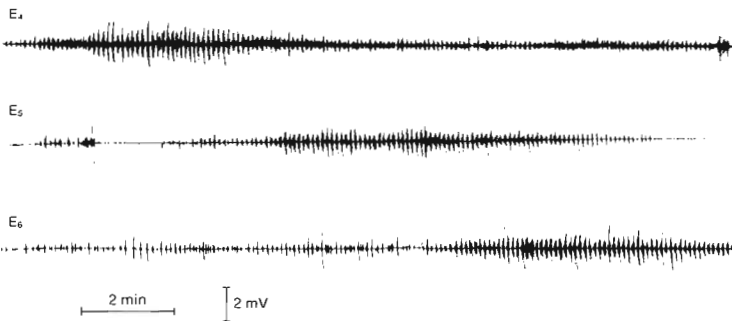


Fig 1—Type 3M ERA, recorded by bipolar electrodes placed 3 cm apart in descending colon, is similar to phase III of migrating myoelectric complexes described in small intestine.

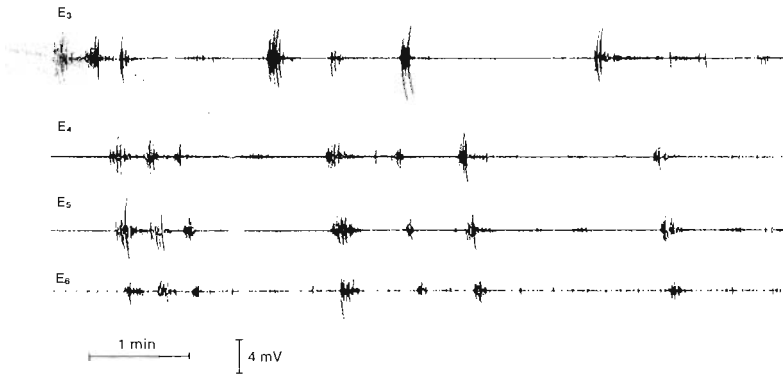


Fig 2—Type 4M ERA. Bipolar electrodes E<sub>3</sub> were implanted in ascending colon, and E<sub>4</sub>, E<sub>5</sub>, and E<sub>6</sub>, in descending colon, 5 cm apart. Note that long ERA bursts seem to start in the ascending colon and to migrate to the descending colon.

## DISCUSSION

Previous reports (1-4) concerning myoelectric activity of the human colon do not address changes observed during the early PO period. Such changes are of importance, physiologically as well as economically, to both patients and surgeons. In our study, appearance of ERA types 3M, 4M, and 5M was associated with progressive clinical recovery from PO ileus. The time frame of resolution of PO ileus in man is consistent with that of subhuman primates as previously reported from this laboratory (5). Random colon ERA is absent, if at all, for only a short PO period. Functional return of ERA progresses from short bursts (type 2), randomly migrating bidirectionally (type 2M), to clusters (types 3 and 3M) noted on PO days 2 and 3, thence to longer bursts (types 4 and 4M) seen on PO days 2 to 4, culminating in long aborad migrating contractions (type 5M) appearing by PO day 4 and associated with clinical recovery from PO ileus.

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