AN EARLY STAGE IN THE TRANSITION OF THE INTESTINE FROM THE UMBILICAL CORD

H. MAISEL, M.B., CH.B., *Department of Anatomy, University of Cape Town*

Only 10 human embryos showing the intestine partially in the umbilical cord and partially in the abdomen have been recorded in the past. In 1898 Mall[7] stated that he had never seen the transition stage in the human embryo and concluded that the return of the intestine from the umbilical cord must be a rapid and total action. However, the following year he described a specimen in which the caecum alone remained in the cord.[8]

Since then further specimens have been described by Bardeen[1] (1914), Vogt[12] (1917) and Ekehorn[2] (1916). Pernkopf[9] (1925), and Snyder and Chaffin[10] (1952) each reported single specimens.

To this small collection another specimen is now added. Whereas the embryos previously described show later stages in the transition of the bowel from the umbilical cord, this specimen reveals one of the earliest stages in this process. The embryo was received from the Gynaecology Department, New Somerset Hospital, Cape Town, following an abortion in a Coloured female. It was immediately fixed in 5% formalin, and examined 24 hours later. The membranes of the umbilical cord were opened and the bowel therein studied. Thereafter the abdominal wall was removed to view the intra-abdominal gut.

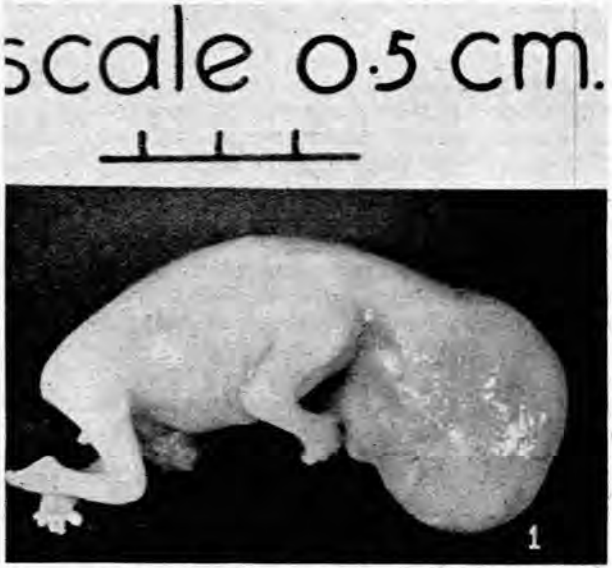

Fig. 1. Photograph of 34 mm. CRL embryo, lateral view. Note bowel lying extra-abdominally in the umbilical sac.

DESCRIPTION OF THE EMBRYO

The embryo measures 34 mm. C-R length. No abnormal external features were noted (Fig. 1).

(A) *The Bowel within the Umbilical Cord*

The greater length of the small intestine lies within the umbilical coelom, massed in coils to the right of and below the proximal colon (Fig. 3). The colon loops over the coils of the small intestine and enters the abdominal cavity in the midline, lying immediately to the left and slightly superior to the emerging loop of small bowel. The ileum curves upwards to enter the colon on its right side and from below (posterior-aspect), this junction being marked by a local dilatation of the large bowel. The caeco-appendix curved forwards and to the right of the terminal ileum, ending in a filamentous structure visible to the naked eye. The antero-posterior view of the ileo-caecal junction and caeco-appendix shows the following points (Fig. 2): (The position of the ileo-caecal junction and appendix has been reversed to correspond with the adult appearance so that the anterior aspect in the drawing corresponds to the posterior surface of the embryonic caeco-appendix after complete rotation of the gut has occurred).

1. The caecum is clearly indicated in this specimen as the proximal dilatation, while the distal narrower portion is the vermiform appendix. Much confusion still exists regarding the stage in embryonic development when the caecum is

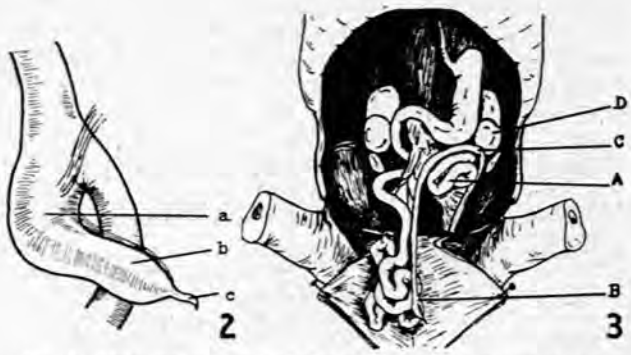

Fig. 2. Drawing, antero-posterior view, of ileo-caecal region.
a—Caecum; b—Vermiform appendix; c—'Transient' appendix.
Note the presence of the anterior ileo-colic fold and meso-appendix.
Fig. 3. Drawing, 34 mm. CRL embryo, anteroposterior view. The abdominal wall has been removed and the membranes of the cord opened.
A—First coil of small bowel reduced into the abdominal cavity; B—Ileo-caecal junction; C—Colic angle; D—Left kidney.

first observed as distinct from the appendix. Tarenetzky[11] (1881) observed that these organs could only be clearly distinguished from each other in embryos of 65 mm. length. Gladstone and Wakely,[3] in describing the caeco-appendicular region in embryos of 45 mm. CRL, state '. . . the differentiation of the caecum from the appendix has not yet taken place'; while Keith[5] maintains that the caecal diversion is of the same calibre until the 5th month. Kelly and Hurdon,[6] however, were able to distinguish a larger proximal pouch—the caecum and a smaller distal part in embryos of 8 weeks age.

In this specimen the presence of two folds of mesentry in the caeco-appendicular region (Fig. 2) further serves to distinguish these organs. One such fold crosses posterior to the ileo-caecal junction and becomes lost on the posterior aspect of the proximal wider part. This is the *ileo-colic* fold which in the adult is attached to the anterior aspect of the caecum. The second fold which crosses the caecum on its anterior aspect, attached along the inner or iliac border of the distal part, is the meso-appendix.

2. The terminal filament arising from the apex of the appendix is the so-called 'transient appendix' first described by Kelly and Hurdon[6] (1905). They found that it appeared in embryos of 10-20 mm. length and disappeared very soon afterwards. Gluckman,[4] however, was able to observe this process in embryos of up to 120 mm. length. He found that it reached its maximum development in embryos of 40-50 mm. length when it is visible to the naked eye 'as a thick fibrous process rather rigid, and resembling a snail's horn'. By comparing this structure with the contractile appendix as found in the lower monkeys, he believes that this supports the theory of ontogenetic recapitulation in the human embryo. Persistence of this transient appendix is regarded as providing an embryological basis for the presence of a supernumerary appendix.

(B) *The Bowel within the Abdominal Cavity*

The first coil of small bowel returning into the abdominal cavity curves below and to the left of the superior mesenteric artery (Fig. 3). The proximal part of the hind-gut and the termination of the mid-gut (distal transverse colon) form the colic angle which is in close proximity to the duodeno-jejunal flexture and is related posteriorly to the medial aspect of the lower pole of the left kidney. The returning coil of small bowel elevates the colic angle both upwards and outwards while it lies anterior to the mesentery of the hind-gut pushing this over to the left. The colon distal to the colic angle passes medial to the left gonad.

SUMMARY

An early stage in the transition of the intestines from the umbilical cord to the abdomen is recorded. Observations are noted on the appearance of the intra- and extra-abdominal gut, with particular reference to the ileo-caecal region. The caecum and appendix are clearly differentiated at this stage and the presence of the transient appendix is indicated.

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