The Costo-Uterine Muscle of the Guinea-Pig:  
A Smooth Muscle Attaching the Uterus to the Last Rib

Giorgio Gabella
Department of Anatomy, University College London, Gower Street, London, England

Summary. A conspicuous smooth muscle (of transverse sectional area comparable to that of the taenia coli) situated in the suspensorium ovarii and in the ligamentum ovarii proprium of the guinea-pig is described. The muscle is attached to the last rib, it reaches the medial side of the ovary, to which it is loosely attached; it passes beyond the caudal pole of the ovary (from which it receives additional muscle bundles), it approaches the oviduct, passing ventral to it, then it spreads around it and eventually reaches the distal end of the uterus; this muscle (which is here indicated as costo-uterine muscle) is in direct continuation with, or transforms itself into, the longitudinal outer coat of the uterus.

Key words: Smooth muscle – Uterus – Ovary – Uterine ligaments.

Introduction

The majority of smooth muscles occupy the walls of hollow organs (vessels or viscera). There are, however, some smooth muscles which are inserted onto the eyeball and the eyelid (such as the Müller muscle) (Whitnall, 1932), or are situated within the skin (such as the arrectores pilorum) or extend from skeletal points to some viscera. Among the last the ano-coccygeus muscle has been extensively studied in the rat (Gillespie, 1972; Gillespie and Lüllmann-Rauch, 1974) and the recto-coccygeus muscle in the rabbit (Ambache, Killick and Zar, 1974; Davey, Gibbs and McKirdy, 1975); these muscles extend from the caudal part of the spine to the terminal part of the gut. The muscle or ligament of Treitz (suspensory muscle of the duodenum) extends from the lumbar vertebrae to the duodeno-jejunal junction (Indar, 1952; Argéme, Mambrini, Lebreuil and Guériné, 1970). Bundles of smooth muscle or laminar smooth muscles are known to occur in the peritoneal connections of some viscera to the abdominal wall or in large peritoneal folds (such as the smooth muscle present in the mesotubarium superius of the rabbit [Halbert and Conrad, 1975]).
This paper reports the topography and structure of a smooth muscle running from the ribs to the uterus of the guinea-pig. The anatomy of this region has been described by Drahn (1924), who already reported the occurrence of smooth muscle in the *suspensorium ovarii* and in the *ligamentum ovarii proprium*.

**Material and Methods**

Adult non-pregnant female guinea-pigs were used, weighing 400–700 grams. For light microscopy the ovary and the neighbouring organs were fixed *in situ* with the Carnoy mixture or with formol-saline. Uterus, ovary and all peritoneal connections were dissected out and embedded in wax. Serial sections were cut and stained with hematoxilin and eosin or with the van Gieson method. For electron microscopy the tissues were fixed for 3 hr at room temperature with 5% glutaraldehyde in 0.1 M Na cacodylate at pH 7.4. After osmication for 1 hr the specimens were block stained in saturated aqueous uranyl acetate, dehydrated in ethanol and embedded in Araldite. Thin sections cut with glass knives were stained with lead citrate.

**Results**

*Gross Anatomy.* A band of fleshy tissue extends from the lower edge of the thoracic cage to the medial aspect of the ovary (hilum) (Fig. 1). This structure, which corresponds to the *suspensorium ovarii* (Drahn, 1924) occupies a fold of the peritoneum and it measures about 17 mm in length. It is attached to the ventral aspect of the last (13th) rib about 14 mm from the vertebral bodies. When transilluminated it can be followed along the medial aspect of the ovary and further down until it joins the cranial end of the uterus (uterine horn): the latter part corresponds to the *ligamentum ovarii proprium*. The whole band of tissue (which is made of smooth muscle, see below) can be easily dissected free from the ovary and from the peritoneal connections to the posterior abdominal wall.

On the lateral side of the ovary, and slightly posterior to it, the oviduct (uterine tube), which originates from the cranial end of the uterus, ascends with a highly coiled course up to 1–2 mm above the cranial pole of the ovary: from this point the terminal part of the oviduct (fimbria) descends with a straight course on the

![Fig. 1. Schematic representation of the course of the costo-uterine muscle and its relation to the last rib, kidney, ovary and uterus](image-url)