

Editorial Note on Cecum Location in Rats for Intraperitoneal Injections

Jessy Siba*

Department of Gastroenterology and Digestive Diseases, Egypt

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Intraperitoneal injection may be a common route for parenteral administration of medicine in rodents. A significant consequence related to this system, however, is that the puncture of important organs like the cecum, which causes pain and infrequently peritonitis. Reports have described the cecum as located on either side of the lower abdomen, contributing to the thought that intraperitoneal injections are often performed in either side. The authors investigated the situation of the cecum in male and female albino and pigmented rat strains, and evaluated the results of intraperitoneal injections within the right and left portion of the lower abdomen. Of the rats they investigated, 71.8% had ceca on the left side of the abdomen. The authors also found that injections on the left side were more likely to end in punctured ceca.

Intraperitoneal injection may be a common route for parenteral administration of medicine in laboratory rodents. The i.p. technique allows for the deposition of drugs into the greater peritoneal sac, which is made by the peritoneum, a serosa that covers the interior walls of the abdomen (parietal peritoneum) and most of the abdominal organs (visceral peritoneum). Under normal circumstances the peritoneum is transparent and smooth, functioning to stop friction between the moving viscera, like the intestines. The peritoneum also maintains the abdominal organs in situ and acts as a medium for his or her blood and lymphatic vessels.

In rats, substances deposited into the greater peritoneal sac are absorbed by vessels like the colic, the intestinal, and therefore the mesenteric veins, which converge into the anterior vena mesenterica that carries blood via the vascular system into the liver¹. After being metabolized within the liver, i.p.-injected substances are carried with deoxygenated blood by the inferior cava vein into the proper atrium of the lungs. The arteria pulmonalis distributes this blood to the lungs to be oxygenated, returning via the vena pulmonalis into the left atrium of the heart then to the ventricle and eventually into the cardiovascular system at large. Despite this seemingly lengthy process, the speed of absorption following i.p. injections is between 25% and 50% the speed of intravenous injection².

The i.p. technique is straightforward and doesn't require much training. Rats are often injected daily over the course of several days (for 3–4 weeks, for instance), and with the right precautions this daily procedure doesn't cause any serious complications. However, even one poorly administered i.p. injection can have adverse consequences, including lesions of the interior organs and peritonitis (inflammation of the peritoneum). This is often not only painful for the rats, but can cause death if bacteria from the intestines enter the cardiovascular system, causing bacteremia and septic shock.

Given the potential for complications from i.p. injections, all personnel who perform this procedure in laboratory rats should be trained by a veterinarian or an experienced laboratory animal care technician. The training procedure should include an appropriate explanation of the technique, also as a review of the abdominal anatomy, in order that trainees understand the right location of organs which will potentially be punctured by the needle (Fig. 1). The cecum, for example, is that the largest structure within the lower abdomen, and therefore the distension of its walls make it more likely to be pierced by a needle relative to the less distended walls of the tiny intestine. Unfortunately, there are not any reliable sources of data with reference to the cecum location and therefore the appropriate side for injections.

*Correspondence to:

Jessy Siba,

Faculty of Medicine

Department of Gastroenterology and Digestive Diseases,

Tanta University,

Tanta, Egypt.

Email: gastrores@peerjournals.com