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## Ultrasonography of Acute Retroperitoneum

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The retroperitoneum (RP) is the space behind the peritoneum and intestines. The RP comprises three spaces, namely the anterior pararenal space, perirenal space and posterior pararenal space. The anterior pararenal space is confined by the peritoneum anteriorly and the anterior renal fascia posteriorly. The perirenal space is bordered by the anterior and posterior renal fascia which fuse to become the lateroconal fascia, while the posterior renal space is confined by the posterior renal fascia and transversalis fascia. The anterior pararenal space contains the pancreas, second and third portions of the duodenum, the vertical colon and distal common bile duct. The kidneys, adrenal glands and ureters are the viscera in the perirenal space. The posterior pararenal space contains no viscera but soft tissue and vessels, mainly the aorta, inferior vena cava and iliac vessels. Lesions of the RP may present as acute abdomen with pain over the abdomen, epigastric, flank or back areas. Acute diseases in the anterior pararenal space include acute pancreatitis, appendicitis, diverticulitis and neoplasm of vertical colon, and lesions of the distal common bile duct and duodenum. Acute diseases of the RP in the perirenal space comprise those of the adrenal glands, e.g. adrenal hemorrhage, and the urinary tract, e.g. acute pyelonephritis, acute emphysematous pyelonephritis, acute distension of renal capsule (caused by perirenal urinoma, renal or peri-renal abscess, and hemorrhage), acute ureteral obstruction (due to urolithiasis or blood clot), chronic ureteral obstruction or stricture (due to previous surgery, retroperitoneal fibrosis, and radiation therapy), renal neoplasms (renal cell carcinoma, and urothelial carcinoma), and acute renal infarction. Other

diseases related to acute RP comprise mycotic or ruptured aortic aneurysm, retroperitoneal tumors such as benign or malignant tumors of mesenchymal origin, and congenital anomalies (obstruction of the uretero-pelvic junction). CT is one of the common imaging modalities to assess a patient with acute RP. In comparison with ultrasound, it has the strengths of higher accuracy, global depiction, less operator-dependency with objectiveness, better delineation of soft tissue strands or fascial changes, and higher specificity in delineating abnormal gas, stone, or urolithiasis. Magnetic resonance imaging has the merits of higher tissue contrast, multiplanar capability, and lack of ionizing radiation, but it has the weaknesses of higher cost, more time consumption, and some contraindications. Ultrasound has the advantages of non-irradiation, lower cost, multiplanar and repeated scanning, availability of color flow information and handheld devices to assess the point of discomfort at the bedside. It is essential to use the acoustic windows such as liver, spleen, kidneys, adequately distended bladder and soft tissue for optimal scanning and delineation of the viscera, vessels and soft tissue in the RP. In this lecture, the imaging, especially the role of ultrasonography in acute RP will be presented and discussed.