CT scan findings of cardiac arrest

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Patient: 40 years, male

Clinical History:
A report of CT scan findings of a patient who arrested in the scanner. Dependant pooling of contrast in the right side of the body and dense abdominal veins were seen on the CT films. Also right testicular vein enhancement and contrast leak through femoral line were noticed.

Imaging Findings:
A 40-year-old male septic patient with ambiguous abdominal pathology was brought to the radiology department to undergo a diagnostic contrast enhanced CT scan. The scan was done with a 16 multi-detector row spiral CT scanner (Toshiba, Aquilion, Japan), where 100 ml of Niopam 300 was injected into the right anticubital vein at a rate of 3.0 ml/s. During scanning the patient arrested and was resuscitated successfully. However, the radiological CT scan findings were saved. The results of the CT scan did confirm an intra-abdominal source of infection suggested by thickened bowels wall and presence of air in the bowels’ wall (pneumocolio), but the striking findings of all were “dependent pooling” of the contrast in the right side of the body, poor enhancement of abdominal viscera and poor arterial enhancement with reflux of contrast from the Superior Vena Cava (SVC) to the Right Atrium, Inferior Vena Cave (IVC), Right Hepatic Vein (RHV), right lobe of the liver, Right Renal Vein (RRV) and right kidney. There was also opacification of the coronary sinus, the posterior vertebral venous plexus and ascending lumbar veins. A blood-contrast level was also demonstrated in the IVC. The most striking features, which we believe have not been described before, were opacification of the right and left testicular veins and back-flow of the contrast in a right sided femoral line.

Discussion:
With the ever increasing numbers of CT scanners available to the use of the emergency department doctors, and with the faster speeds with which the new scanners are able to obtain scans, doctors are becoming less and less reluctant to use CT scans in the investigations of patients whose hemodynamic status are borderline. Consequently more and more cases of cardiac arrest during CT scanning are being reported. The first series to be published in English language was by Tsai et al on reviewing CT findings of five patients who developed cardiac arrest during scanning. They described “pooling of contrast agent in the dependent parts of the right side of the body” a phenomenon believed to be caused by loss of the forward motion of the blood and contrast due to the loss of the pumping action of the heart, thus the only force responsible for moving the contrast forward is the force with which the injector injects the contrast into the circulation. Another series was published soon after by KO et al featuring five other cases of cardiac arrest during CT scanning, in which the radiological sign of “Dense Abdominal Veins” was described. Our case was able to demonstrate the pathognomonic features of cardiac arrest during CT, with reflux of contrast from the Superior Vena Cava (SVC) to the Right Atrium, Inferior Vena Cave (IVC), Right Hepatic Vein (RHV), right lobe of the liver, Right Renal Vein (RRV) and right kidney. There was also opacification of the coronary sinus, the posterior vertebral venous plexus and ascending lumbar veins. A blood-contrast level was also demonstrated in the IVC. The most striking features, which we believe have not been described before, were
opacification of the right and left testicular veins and back-flow of the contrast in a right sided femoral line which was inserted into the patient's right common femoral vein for resuscitation, a phenomenon- yet to prove- that the only driving force of the forward motion of the contrast during a cardiac arrest may be the force with which the contrast is injected into the circulation, which in our case was strong enough to cause back flow of the contrast in the femoral line. In our patient the calibre of the IVC was noted to be normal, in comparison to the reduced calibre described by Rotondo et al [3] in patients with hypovolemic shock. A phenomenon that, according to Singh et al, is due to the reflux of contrast into the IVC, thereby preventing its collapse. Being familiar with the CT findings of cardiac arrest is of great importance for the doctors looking after the patients undergoing CT scanning, as the recognition of these findings at an early stage can mean early provision of resuscitation for the patient, thus saving precious time.

**Differential Diagnosis List:** CT scan findings of cardiac arrest.

**Final Diagnosis:** CT scan findings of cardiac arrest.

**References:**


Figure 1

Description: Origin:
Figure 2

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