BY CHARBEL SAADE

ABDOMINAL

Peristaltic contrast media injector provides improvements for liver CT

The rapid increase in technological advancement in computed tomography has provided radiologists with submillimetre images with improved quality of the liver parenchyma and vascular system, while being cost effective and accessible. However, the chief focus of CT liver protocols has been overlooked when it comes to contrast media enhancement performance of the liver parenchyma with different types of injection systems. There are currently two types of delivery systems (Figure 1).

The first is direct drive, which is made of a piston plunger that has a ram, which is moved by a drive motor, an elastic head, a stretcher rod, and a syringe. The second is peristaltic drive, which employs compression and relaxation of the tube, drawing the contents into the delivery tube, which creates a seal between the suction and the discharge side of the pump, eliminating product slip and reducing delivery pressure of the contrast media.

The magnitude of liver parenchymal opacification depends on patient-related factors and injection-related factors such as body weight, cardiac output, contrast media volume, contrast media concentration, injection rate and saline chaser. Optimal liver opacification during CT is affected by many contrast media techniques such as a single bolus compared to split bolus injection techniques that can be with or without a saline chaser. In addition, the delivered contrast media volumes range from 80 to 150 mL, with the overall liver parenchymal opacification of 112.4 ± 14.5 HU when compared to different iodine concentrations during split bolus injection protocol. Also, studies have demonstrated that different injection protocols result in variable liver parenchymal enhancement. Saline has a pivotal role in the enhancement of the liver parenchyma, with the lowest recorded enhancement of the liver of 71.5 ± 19.6 HU when a saline flush was injected at a rate of 2 mL/s post-contrast administration, and the highest of 75.1 ± 27.5 HU when the saline flush was injected at 8 mL/s. When no saline flush was administered after contrast injection, the liver enhancement was 74.7 ± 23.1 HU. Therefore, optimal liver parenchymal opacification varies significantly in literature, with limitations in the clinical setting due to contrast media injection parameters, patient selection and scanner parameters during liver CT. In our study we demonstrated that there was no significant difference in total liver, functional or segmental parenchymal opacification between each contrast media injection system with mean opacification from 93–96 HU (which was higher than reported in literature for all liver segments). For the total number of patients being scanned, group A and group B were the same population but underwent two injection techniques with a time duration of approximately one year apart. The study showed that peristaltic drive had increased quantitative image quality, pathology detection, cost saving with lower radiation doses, and contrast volume compared to direct drive injection systems.

Finally, the overall workflow and cost analysis demonstrated a significant saving of $5252.87 (58% saving) for the 182 patients who underwent contrast injection from the peristaltic injector. This cost saving increased revenue for the institution without sacrificing image quality, radiation dose or pathology detection. Employing a peristaltic pump can provide radiology departments a value-based approach to imaging without sacrificing patient outcomes.

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Scientific Session

Thursday, February 28, 14:00–15:30, Room M 2
SS 701 CT technical frontiers in liver imaging

Moderators: A. Blachar; Tel Aviv/IL
C. Sofia; Messina/IT

Multidetector liver CT: improved image quality, decreased radiation and contrast media dose with peristaltic contrast media injection system
C. Saade, S. Khalifeh, L. Karout, L. Naffaa; Beirut/LB

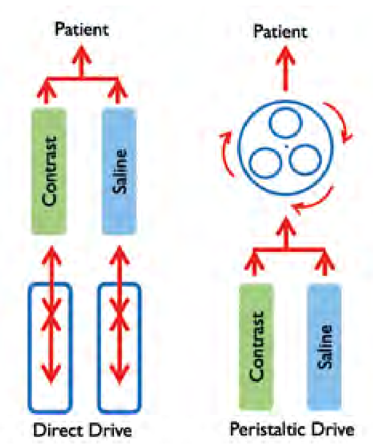

Figure 1: Left: direct drive, which is made of a piston plunger that has a ram, which is moved by a drive motor, an elastic head, a stretcher rod, and a syringe. Right: peristaltic drive contrast injector, which employs compression and relaxation of the tube, drawing the contents into the delivery tube which creates a seal between the suction and the discharge side of the pump, eliminating product slip and reducing delivery pressure of the contrast media.