Obesogenic Profile of Contemporary North American Renal Stone Patients
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Introduction and Objective: Obesity, defined by most studies according to body mass index (BMI), is linked to increased rates of renal stone (RS) formation and treatment failures. BMI has inherent limitations as a measure of obesity and fails to account for fat distribution, a more accurate predictor of morbidity. Patterns of fat distribution may affect the success of extracorporeal shockwave lithotripsy (ESWL), since peripheral adiposity tissue increases the skin-to-stone distance more than does visceral adipose tissue (%VAT). The objective of this study was to characterize the fat distribution and metabolic hormonal milieu in a cohort of RS patients.

Methods: 113 patients (73 male; 40 female; mean age 54 years) undergoing treatment for RS between November 2009 and June 2010 at one center were prospectively enrolled; 81 met inclusion for BMI analysis and 63 for %VAT. CT scans were analyzed for visceral and subcutaneous adipose tissue volumes from axial slices at 3 fixed levels (L2 vertebral body, umbilicus and anterior superior iliac spine) using commercial software (Clear Image Demo). Adipose tissue was defined as -250 to -30 Hounsfield Units. The ratio of visceral to total adipose tissue (%VAT) was calculated and BMI data collected. Adiponectin and leptin levels of fasting serum samples were measured by ELISA.

Results: 28% of patients had BMI within the normal range (<25kg/m²), while 32% were overweight (25<BMI<29.9kg/m²), 21% obese (BMI<35kg/m²) and 19% morbidly obese (BMI>35 kg/m²). Mean BMI was 30.54% of females and 32% of males were obese or morbidly obese (BMI>30). Mean %VAT was 47.7 and 29.71 for males and females respectively (<0.001), indicating relatively higher visceral adiposity in males, and peripheral adiposity in females. Mean levels of adiponectin and leptin were 7.67 and 328% respectively (p<0.001), which generated median times for the intervals between these events. The procedure, note completion and transcription dates were recorded by experts. The records of 255 procedures were reviewed. For each operative report, the total number of completed components was tallied. The optimal components of a complete operative record for partial and radical nephrectomy performed for kidney tumor were agreed on by experts. The records of 255 procedures were reviewed. For each operative report, the total number of completed components was tallied. The percentage of retrieved components was calculated for each group of variables by procedure and by method of documentation. The procedure, note completion and transcription dates were recorded which generated median times for the intervals between these events.

Results: Overall, 66% of dictated notes were complete, compared with 93% of structured notes. Completion rates for dictated open radical, open partial, laparoscopic radical and laparoscopic partial nephrectomy were 65%, 63%, 74%, and 70%, respectively. Corresponding percentages for respective structured notes were 96%, 88%, 95%, and 97%. Both dictated and structured notes were generated on the day of surgery. However, eKidney-generated notes were instantaneously uploaded to the EPR, while dictated notes were transcribed after a median of 2 days.

Conclusions: Our study demonstrates that operative notes completed using eKidney structured templates are significantly more complete and timely than those dictated in the standard manner. Structured documentation is a powerful tool to ensure important procedural details are recorded.
Ex Vivo and In Vivo Validation of a Novel Radiofrequency Ablation (RFA) Device for Treating Large Tumours

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Introduction and Objectives: Radiofrequency ablation (RFA) has been shown to be a safe and effective treatment in a selected group of patients with renal tumors <3cm. The current limitations of the method are the procedure duration and small, non uniform coagulate tissue volumes which limits its application for larger tumours. The objective was to evaluate a novel monopolar RFA device that can treat large liver and kidney tumours >4 cm in diameter within an acceptably shorter time.

Materials and Methods: A novel loosely wound coil, composed of Nitinol, operated at 27.12 MHz with power settings between 100 and 200W was evaluated in both ex vivo and in vivo. In the ex vivo experiment (n = 161) the novel RFA device treated bovine liver encased in a polyacrylamide phantom. The in vivo tests (n = 8) were performed on live pig kidneys (n = 7) and liver (n = 11). Impedance was measured before treatment and temperatures within the ablation zone were recorded during the procedure. The ablated tissue underwent a gross and histological evaluation. Tissue specimens were stained with nicotinamide adenine nucleotide (NADH) to assess cell viability. The ablation volume measurements in vivo trials were confirmed with contrast enhanced CT imaging.

Results: In the ex vivo tests, the average ellipsoidal ablation volume was 64.2 (±11.6) cm³ with an average treatment time of 9.5 (±3.2) minutes. For the in vivo tests the average kidney and liver ablation volumes were 33.2 (±17.4) and 51.5 (±17.2) cm³ with an average treatment time of 10.4 (±4.8) and 10.8 (±5.1) minutes, respectively. The kidney ablation volume was limited by the organ’s size and tissue boundaries. Both temperatures measured in the center and on the wire of the coil reached plateaus of >90 degrees Celsius. Histological sections revealed uniform cell necrosis with a distinctive edge demarcating the ablation volume, which correlated with CT imaging. A minimal reduction in ablation volume in the perfused in vivo environment was found.

Conclusion: Our novel RFA coil device is able to successfully ablate large tissue volumes >4 cm in diameter, creating a uniform necrotic zone within a short treatment time evident in both ex vivo and in vivo settings. Further tests are needed to evaluate safety and efficacy of this new RFA modality in human models. The device’s ability to achieve high temperatures within a short time may help reduce vascular heat sink effect and minimize immune system response.