

As we can see all efforts are been doing now by radiologists in order to perform a low-dose CT protocol. While acquiring thin slices with high spatial resolution, we can reduce the dose to similar values as in conventional radiography, especially when examining under high-contrast conditions. Using all these various options available, radiation exposure can sometimes even be lower than using a conventional single-slice helical CT. By using low dose-CT protocol we can reach similar sensitivity, specificity and accuracy. For the detection of urolithiasis, for example, low dose CT protocol is superior to IVU and confers a total dose of 2.8 mSV, which is about double that for IVU and about 75% and 50% of that for non-optimized UHCT protocols. Recently these low dose noncontrast CT protocols has been shown to be useful also for the diagnosis of stones in pregnant women and children.

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## UROGENITAL TRAUMA

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### **Does tachycardia correlate with hypotension after trauma?**

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J Am Coll Surg. 2003; 196: 679-84

*Comment in: J Am Coll Surg. 2003; 197: 697*

**Background:** Tachycardia is believed to be closely associated with hypotension and is often listed as an important sign in the initial diagnosis of hemorrhagic shock, but the correlation between heart rate and hypotension remains unproved.

**Study Design:** Data were collected from all trauma patients, 16 to 49 years old, presenting to our university-based trauma center between July 1988 and January 1997. Moribund patients with a systolic blood pressure  $<$  or  $=$  50 or heart rate  $<$  or  $=$  40 and patients with significant head or spinal cord injuries were excluded. Tachycardia was defined as a heart rate  $>$  or  $=$  90 and hypotension as a systolic blood pressure  $<$  90.

**Results:** Hypotension was present in 489 of the 14,325 admitted patients that met the entry criteria. Of the hypotensive patients, 35% (169) were not tachycardic. Tachycardia was present in 39% of patients with systolic blood pressure 120 mmHg. Hypotensive patients with tachycardia had a higher mortality (15%) compared with hypotensive patients who were not tachycardic (2%,  $P = 0.003$ ). Logistic regression analysis revealed tachycardia to be independently associated with hypotension ( $p = 0.0004$ ), but receiver operating curve analysis demonstrated that the sensitivity and specificity of heart rate for predicting hypotension is poor.

**Conclusions:** Tachycardia is not a reliable sign of hypotension after trauma. Although tachycardia was independently associated with hypotension, its sensitivity and specificity limit its usefulness in the initial evaluation of trauma victims. Absence of tachycardia should not reassure the clinician about the absence of significant blood loss after trauma. Patients who are both hypotensive and tachycardic have an associated increased mortality and warrant careful evaluation.

**Inconsistent finding of tachycardia in World War II combat casualties**

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*J Am Coll Surg. 2003; 197: 697*

The article by Victorino and colleagues is a welcome reminder that tachycardia does not always accompany severe hemorrhage (1). It is of more than historical interest that American military surgeons recognized the inconsistent presence of tachycardia in wounded soldiers during World War II in some of the earliest clinical investigations carried out on traumatized humans. These data were published in the volume entitled *The Physiologic Effects of Wounds* (2), which is part of the Surgeon General of the Army history of medicine and surgery in World War II. I have summarized some of the more applicable hemodynamic data from Table 8, page 34, and Table 9, page 35, in Table 1, following, although this is no substitute for reading the entire chapter, "Initial State of Entry to Hospital." On average, the casualties (n = 106) were studied some 6 hours after trauma and before the beginning of resuscitation, though some had been given several units of plasma and almost all had received morphine. The most common injuries found in those in severe shock were traumatic amputations, extensively comminuted open extremity fractures, and penetrating thoracic injuries. Measurements of blood volume using a dye dilution methodology were performed in about half of the study population (page 56). Estimated average blood volume losses, as a function of degree of shock, were: none, 14.4%; slight, 20.7%; moderate, 34.3%; and severe, 45.9%. The authors concluded with the following observation (page 34): "The finding that the average as well as the minimum and maximum pulse rates was the same in all degrees of shock was surprising. It is of interest that even patients judged to be in severe shock can have a pulse rate as low as 60 beats per minute." Data such as these and those reported in the article by Victorino and colleagues (1) speak strongly in favor of modifying the long-standing ATLS teaching on the relation of heart rate to hemorrhage.

**Table - 1**

Degree of shock	Pulse rate,* average (range)	Blood pressure,* systolic/diastolic
None	103 ± 7.2 (70 – 140)	126 ± 11.9 / 75 ± 1.5
Slight	111 ± 3.4 (88 – 150)	109 ± 3.0 / 66 ± 2.7
Moderate	113 ± 3.6 (80 – 160)	95 ± 4.9 / 58 ± 3.5
Severe	116 ± 3.3 (60 – 144)	49 ± 7.6 / 25 ± 5.8

\*Standard error of the mean.

**References**

1. Victorino GP, Battistella FD, Wisner DH: Does tachycardia correlate with hypotension after trauma? *J Am Coll Surg.* 2003; 196: 679–84.
2. The Board for the Study of the Severely Wounded. *The Physiologic Effects of Wounds.* Washington, DC: Office of The Surgeon General; Department of the Army; 1952; 21-74.

**Editorial Comment**

A major part of modern trauma surgery is determining when patients are at risk of death or disability from ongoing blood loss. This is particularly important when determining if a patient needs open exploration for renal trauma. Most surgeons use a combination of serial hematocrit designations, vital signs, and "clinical judgment" to determine when patients are losing blood rapidly. Two excellent recent reports shed light on the

utility (or lack of utility) of an increased heart rate (tachycardia) in the evaluation of the injured patient. Basically, they determine that tachycardia is not a universally reliable indicator of blood loss. Other determinants such as serial hematocrit or hypotension must be used instead.

In the first report, 14,000 trauma patients were analyzed. While increased heart rate did correlate with hypotension and blood loss, it had poor sensitivity and specificity. The study also found that up to 35% of patients exhibited bradycardia and not tachycardia as a sign of severe bleeding.

The second publication on this subject is a letter, which supports the findings of the Victorino et al. study by invoking a similar study of war wounded from 50 years ago. In this review of 106 battle casualties, the range of pulse rates between those with no blood loss or shock compared to those with moderate and severe blood loss / shock were quite similar. Just as in the more modern series, the overlap made tachycardia nearly useless as a universally-reliable indicator of even the most severe bleeding. Although heart rate should not be completely ignored in the trauma patient, it must be realized that if the heart rate does not correlate with other signs of blood loss, further investigation is warranted. As a single determinant of blood loss, tachycardia is simply not very useful.

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### **Validity of computerized tomography in blunt renal trauma**

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*J Urol. 2003;170: 2475-9*

**Purpose:** Improved imaging techniques and new therapeutic possibilities require rethinking the indication for laparotomy with regard to blunt renal trauma. Refined classification systems would facilitate the decision relating to therapy but they are based on knowledge of the imaging accuracy of computerized tomography (CT). We evaluated the validity of the CT depiction of renal injuries.

**Materials and Methods:** A total of 42 porcine kidneys were subjected to traumatization of various degrees. They then underwent CT examination and were subsequently cross-dissected into slices 3 mm thick. The comparative evaluation involved 2,080 CT images and 1,819 macroscopic sectional views, which showed 3,521 and 3,778 individual lesions, respectively.

**Results:** Using CT the overall extent of injury in renal trauma was only slightly overrated at an average of 15% higher than that seen on macroscopy. Simple linear lesions tended to be over assessed and parenchymal destruction tended to be under assessed. Central lesions were depicted more frequently than peripheral lesions. CT of medullary lesions and parenchymal detachment was not feasible.

**Conclusions:** CT of the kidney enables the distinction of different kinds of lesions and their localization well. Pelvic structures or vessels can imitate linear lesions. However, this imaging procedure can be used as a basis for refining categorization systems for blunt renal trauma. It can also be used to obtain a large quantity of lesion data for biomechanical investigations.

### **Editorial Comment**

Computed tomography (CT) is the undisputed state of the art when it comes to evaluating renal injuries. However, despite wide use, and a number of clinical studies supporting its accuracy, few experimental studies

have been published which evaluate the accuracy of CT scanning in renal trauma. Although this study has some shortcomings inherent in the use of animals (experimental model of renal injury may or may not model human injuries well, pig kidneys may not be identical to human kidneys, etc.) it is a valuable experimental look at the correlation between CT imaging and known renal injuries.

In this study, 42 pig kidneys underwent experimental injury and over 2,000 CT images of the kidneys were compared to macroscopic sections of the injured renal units. They concluded: 1) CT overestimates the degree of injury (as scored by the authors own scoring system) by only 15%, 2) Parenchymal disruption is slightly overestimated because of the confounding appearance of normal renal tissue such as blood vessels.

The authors made no attempt to model vascular injury or penetrating injury. Also, they did not attempt to validate CT in evaluating renal trauma in line that corresponded to the 5-part American Association for the Surgery of Trauma (AAST) Organ Injury Severity Scale for the Kidney. However, this study appears to lend experimental support to the common clinical practice of using CT to accurately determine the extent of blunt renal injury.

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## **PATHOLOGY**

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### **Visual estimate of percent of carcinoma predicts recurrence after radical prostatectomy**

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*J Urol. 2003; 170: 1194-8*

**Purpose:** Tumor volume is an important prognosticator for predicting prostate cancer recurrence following radical prostatectomy (RP). We assessed the ability of the visual estimate of the percent of carcinoma (VEPC) to predict recurrence.

**Methods and Materials:** As performed by 1 surgeon (MSS), 1,114 men underwent radical prostatectomy between 1992 and February 2002. Patients who had less than 12 months of followup, who underwent salvage RP or in whom VEPC was not assessed in the pathology specimen were excluded. VEPC and other clinical variables were analyzed. We performed univariate analysis using the Kaplan-Meier log rank test. Multivariate analysis using Cox proportional hazards regression was performed.

**Results:** A total of 692 patients with a mean age of 61 +/- 7 years met the criteria for this analysis. Mean followup was 52 +/- 30 months. Of the patients 17% had biochemical recurrence. Mean VEPC was 25% and 13% in those with and without recurrence, respectively. On univariate analysis all variables were significant predictors of recurrence. However, multivariate analysis showed that the only significant predictors of recurrence were patient age, initial prostate specific antigen 10 ng/ml or greater, RP Gleason 8 to 10, extraprostatic extension, seminal vesicle involvement and VEPC. Based on disease-free survival curves patients were stratified into 3 broad groups, namely low, intermediate and high volume. The HR for biochemical recurrence was 2.1 for the intermediate VEPC group (9.1% to 20%) and 2.7 for the high VEPC group (greater than 20%). In the reference group it was less than 9% (low volume).

**Conclusions:** VEPC is a simple and inexpensive method that is an independent predictor of recurrence after RP.