Sensitivity and specificity of CT scanning for determining the number of internally concealed packages in 'body-packers'

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- Emergency Department
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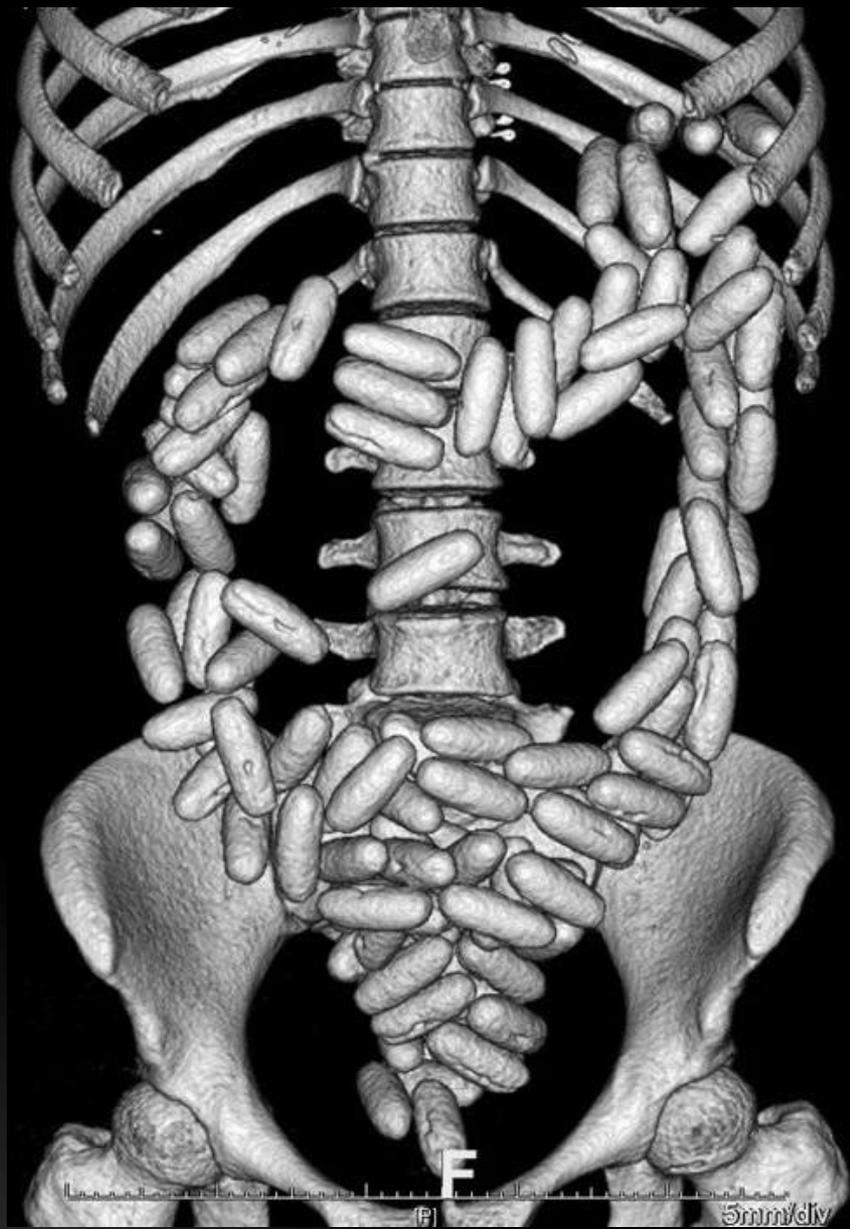
Background & Aim

- Current practice to perform two CT scans
  - One on arrival of suspected 'body-packers' in ED, and a count of packages made
  - One on passing or removal of the reported number of packages, to ensure none remaining
  - ≈ 17.4 mSv = cancer risk of 1 in 1000 to 1 in 10000

- Can the second CT be avoided?
- Aims:
  - Is the first CT package count accurate?
  - Is the number reported by offenders reliable?

Method

- Retrospective cross-sectional analytic study

- October 2008 – September 2013

- All patients brought by police and confirmed with CT or physical evidence to be 'body-packers' were included and notes reviewed

- Index test = number of internally concealed packages on CT report

- Reference standard = number of packages collected after each CT

- Data collected using standardised template to review medical and nursing notes

Results

- 228 suspects; 50 confirmed 'body-packers'; 5 year study period
- 104 CT scans, mean 2 per patient
- Majority concealed in GI tract; majority retrieved PR with laxative
- No complications
- 66% admitted to concealing drugs
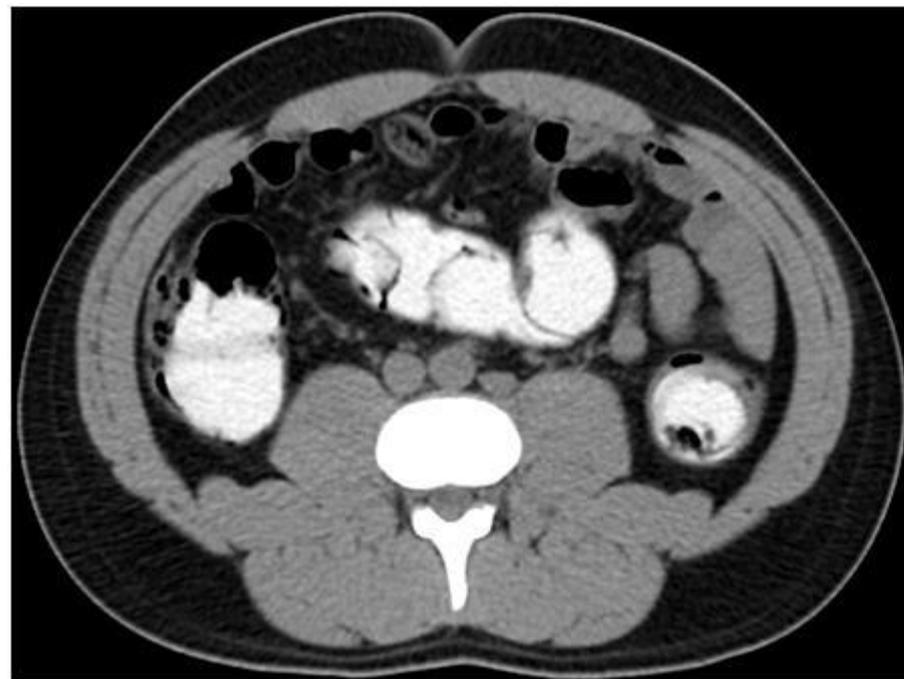
3D reconstruction of a non-contrast CT scan demonstrating a case where multiple packages in close approximation produced a non-discrete appearance, rendering a precise package count impossible.

Results

Baseline characteristics of confirmed body-packers

|			
n (body-packer cases)		50	
Study duration (months)		60	
n (CT scans)		104	
Number of CTs / person	mean (SD)	2 (1)	(Range 0-4)
Packages concealed	median	51	(IQR 5-86, Range 1-187)
Hospital LOS	(days)	1.9	(IQR 1.0-3.0)
Age	(years)	38	(IQR 30-44)
Male		34	(68%)
Sites of concealment			
Gastrointestinal tract		50	(100%)
Vagina		7	(14%)
Foreskin		1‡	(2%)
External to body		3	(6%)
Method of expulsion			
Per rectal expulsion (no laxative)		3	(6%)
Per rectal expulsion with laxative		45	(90%)
Manual retrieval from orifice		7	(14%)
Endoscopic retrieval		2†	(4%)
Surgical removal		0	(0%)
Complications¶		0	(0%)

‡ Unconfirmed, possible concealed foreign body noted on review of CT after discharge; †endoscopic retrieval failed and packages ultimately passed per rectum; ¶ complications considered were package rupture, drug toxicity, bowel obstruction or perforation.

Results

Diagnostic accuracy for the detection of concealed packages

	All CT scans n=84	CT scans <15 packages concealed n=64
True positive	25	25
False positive	8	2
False negative	15	1
True negative	36	36
Sensitivity % (95% CI)	63 (46-77)	96 (80-99)
Specificity % (95% CI)	82 (67-92)	95 (82-99)
PPV % (95% CI)	76 (58-89)	93 (76-99)
NPV % (95% CI)	71 (56-83)	97 (86-100)

Results
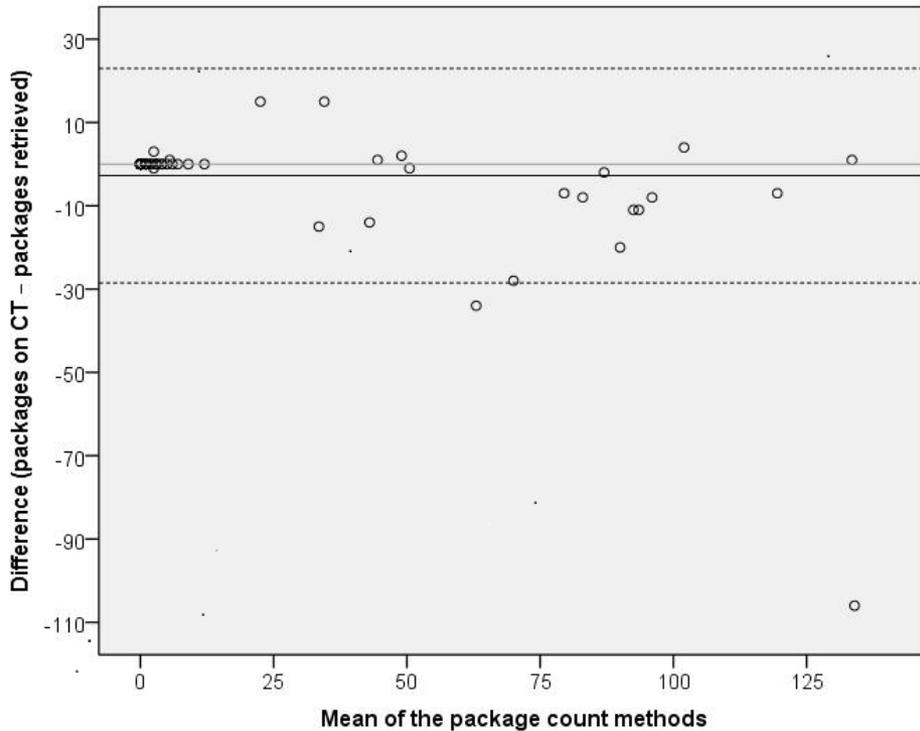
Bland-Altman bias plot for the agreement between package counts determined by CT and the reference standard. (—) Identity/zero difference; (—) Bias/mean difference; (---) 95% limits of agreement (-28.5 – 23.0).
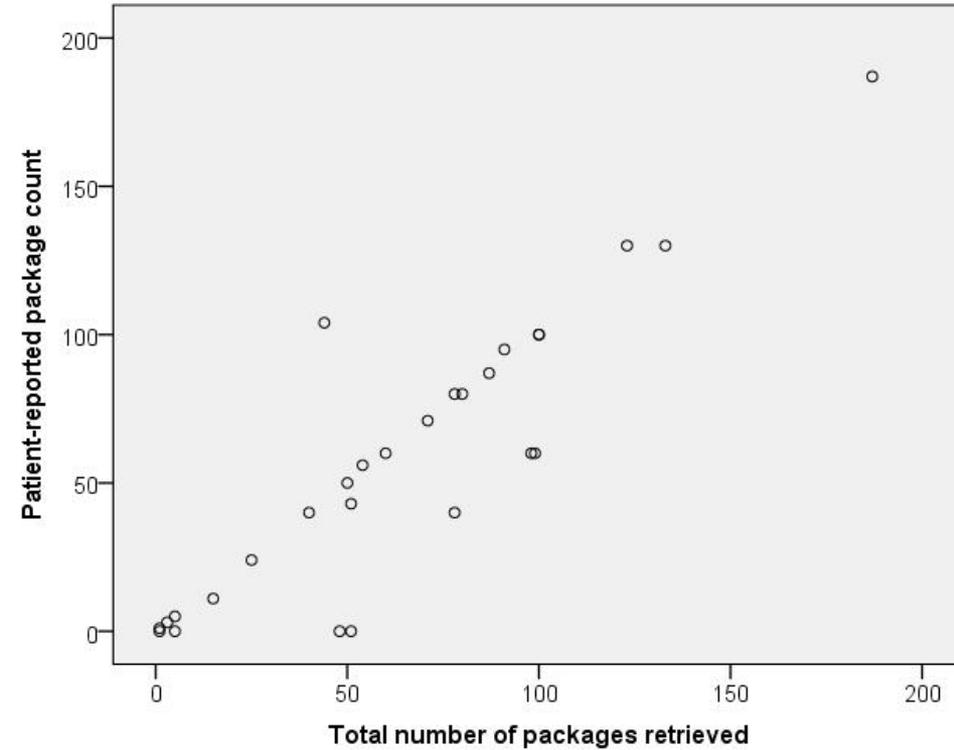
Scatter-plot of the number package reported by the patient to be concealed versus the number of packages retrieved. Correlation co-efficient 0.9 (p<0.001), R^2 = 81%

Discussion & Conclusions

- Accuracy of CT for counting packages is poor
  - Second CT required to confirm absence of drugs

- Accuracy improves with low package counts

- CT performs well as a rule-out test

- The true accuracy of CT scanning is far lower than that found in previous simulated models

- Unnecessary to perform initial CT on confessed 'body-packers' – they are reliable
  - Single CT after passage of confessed number