

## Body Packing: A Review of Imaging Modalities and Aspects

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### Abstract

### Review Article

Body packers is a term given to persons who smuggle drugs by swallowing, or inserting them into a body cavity, as drug filled packets, in an attempt to cross secure borders. Suspected Body packers may be brought to emergency departments under detention by the customs officers or police or may present themselves to emergency department for complications that can be fatal and lead to a death. Imaging plays a main role in screen, diagnosis and follow-up of these cases. The variety of drugs forms, and of new sophisticated smuggling techniques make detecting illicit drugs more difficult. Radiologists should be familiarized with radiological features of different ingested drug packets in all modalities of exams. Plain abdominal film is still the first radiological exam used to screen drug packets. However, many studies proved that it has a low sensitivity. Computed tomography is the most effective and accurate imaging modality to screen and diagnose body packing, and low dose CT seems to be the best alternative to abdominal plain. This review details imaging methods can be used to diagnose body packing and highlights its challenging aspects.

**Keywords :** Computed tomography, CT, Body packing, Drugs, packets, Plain Abdominal radiography, ultrasound.

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## INTRODUCTION

North African countries represent a strategic crossing point for drug traffickers, between Europe, Africa and the South American continent. To avoid detection drugs at border crossings or airport customs, drug trafficking is increasingly performed by intra corporeal concealment.

Last decades, this mode of drug delivery has literally exploded.

Body packers is a term given to persons who, smuggle drugs by swallowing, or inserting drug-filled packets into a body cavity (rectum or vaginal cavity), in an attempt to across secure borders. Body packers are also referred to as “swallowers”, “couriers”, “internal carriers” or “(drug) mules” [1, 2]. “Body pushing” refers to concealing packets by direct insertion into body cavity.

“Body stuffing” is another term used in the literature, for people who try to conceal small amounts of hastily wrapped drugs by swallowing them when coming unexpectedly across law-enforcement officers [2, 3]. Suspected body packers may be brought to

emergency departments by the customs officers or police under detention or may present themselves for complications which are body packer syndrome, ileus, and intestinal or colonic perforation [4]. The variety of Smuggling techniques, forms of drugs and wrapping materials affect the radiological aspects of drugs packets.

Imaging takes a main place in screening and detecting body packing. Plain abdominal radiography is currently the first choice tool adopted for detecting body packing in the routine practice. Several radiological signs in this modality of exam were described in the literature and deemed specifics [3, 5]. However, its sensitivity of detecting body packing remains variable even low, and depends on various factors [2]. The CT scan has demonstrated a superior sensitivity and specificity in evaluating body packers. The constraint of over exposure to radiation can be overtaken by performing low-dose computed tomography [6].

Ultrasonography, as an available, free irradiation and rapid imaging technique, may be used initially to screen illicit packets of drugs. Yet, when it is negative, the diagnosis of body packing is not ruled out. Therefore, it can be recommended as initial orientating imaging tool or for follow up [7].

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This review aims to detail imaging modalities can be used to diagnose body packing and highlights their challenging aspects.

### General Background and Clinical Presentation:

Body packing is becoming now a common method of cross border drug trafficking. It was first described in the medical literature by Deitel and Syed in 1973 [3, 8] who reported a case of small bowel obstruction ensuing ingestion of a condom filled with hashish.

Traffickers may use children or pregnant women as mules to attract less attention [9].

Too many ways are used to hide drugs, by swallowing or even pushing it into the rectum or vaginal cavity.

The main drugs smuggled are cocaine, heroin and cannabis. The most popular one is powdered solid cocaine [10], but liquid cocaine-containing packages have increasingly been reported recently [9, 11].

Synthetic drugs such as Ecstasy, LSD and methamphetamine are uncommonly detected in body packers [5].

The characteristics of packets (number, size, shape and contents) vary widely from a trafficker to another, which will influence appearance on imaging examinations. They can be handmade or produced mechanically with different wrapped materials, such as plastic, cellophane paper, condoms, latex glove fingers, and aluminum foil [2, 4].

The pushed packets into rectum or vagina are usually oval and big, whereas the swallowed ones are round and smaller [3, 12].

The amount of drugs that body packers can ingest is about 1kg divided into 50 to 100 packets [5]. However, cases with more than 200 packets swallowed have been described in literature [3].

To prevent a premature defecation of smuggled packets on flights or before passing customs, body packers use spasmolytics and constipating agents to slow down intestinal transition time. Once they have successfully crossed the border, they take laxatives to accelerate bowel transit [2, 5].

Individuals can be brought to health care for suspicion of a body packing after detention by customs or police officers, or when presenting serious complications such as acute overdose syndromes after a ruptured packet or a gastrointestinal obstruction or perforation [4].

Packets stucked in stomach, are more likely to rupture by the action of gastric acidity leading to a fatal consequences [13, 14].

The probability of packet rupture has decreased by improvement wrapping techniques. Complications by intestinal obstruction and acute intoxication are now estimated to be below 5 % [2, 4].

### Imaging:

Every suspected of body packing needs imaging to confirm the diagnosis unless the packets are discharged from the body.

Screening imaging, based on ultrasound in our country, take usually place at the airport, then the suspected of body packing are brought to hospital to complete imaging assesment even if ultrasound is negative.

If the body packers suffer from signs suggestive of complications, they are systematically brought to hospital where they will undergo imaging most often consisting of radiography or readily a computed tomography.

With any of the imaging techniques, the number of ingested packets is the main factor increasing detectability: more packets are present in the intestines, the higher is the probability of visibility on imaging studies [2].

### Abdominal Plain Radiography:

Plain abdominal radiography, is still considered as the first choice tool employed to screen drug body packing [10].

Packed cocaine, heroin and hashish usually appear more radio-opaque than faecal balls. But the powder of heroin packed may have a density similar to air and cocaine powder a density similar to water [12].

The common drug packet mimicks on plain abdominal radiography are normal intestinal air, calcifications, scybala and other foreign bodies [15, 16].

Therefore, to make detection of drug packets easier, several radiological signs of solid form drugs body packing were described in the literature:

The 'tic tac' sign (**fig 1**) refers to presence of multiple homogeneous radiopaque oval/round shaped foreign bodies with sharp border and clear air–substance interface [17] while the 'bag of eggs' sign is addressed the non-uniform geometric shapes of packing [10].

The 'halo' sign (**fig 2**) is a complete rim of blurred lucency around the drug packet [17]. The 'double condom' (**fig 3**) sign is a radiolucent rim made up by air trapped between the multiple layers of packing [17].

The 'rosette' sign was formed by air trapped in the Packet sealing knot [17].

Ho Kai Patrick Tsang and al. report the classical ‘double condom’ sign in 94% cases, followed by the ‘tic tac’ sign and ‘halo’ sign. The ‘rosette’ sign was only identified in one case [10]. This sign was also absent in all cases in Niewiarowski *et al.*, serie [17].

There are new radiological signs of drug body packing described in the literature, like the ‘parallelism’ sign, which described intra-intestinal drug packets lying in parallel in the bowel lumen [17].

The black crescent’ and ‘lucent triangle’ (fig 4) signs referring to the air around drug packets, in the interface between drug packets or with bowel wall [10].

However, sensitivity of abdominal radiography for detection of drug packets varies widely in the

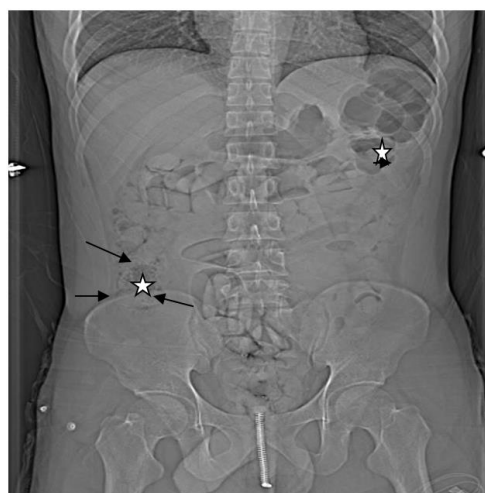
In a study by Poletti *et al.*, [2, 6], sensitivity of plain abdominal X-rays is related to the experience of radiologist, the number and the density of drug packets. Its sensitivity would decrease significantly if less than 12 packets were present, when compared to low-dose CT.

Furthermore, the task is more difficult when it is about identifying liquid cocaine filled packets [10].

Bulakci *et al.*, [1] reported that plain X-ray films were significantly less sensitive and specific for liquid-cocain packets.



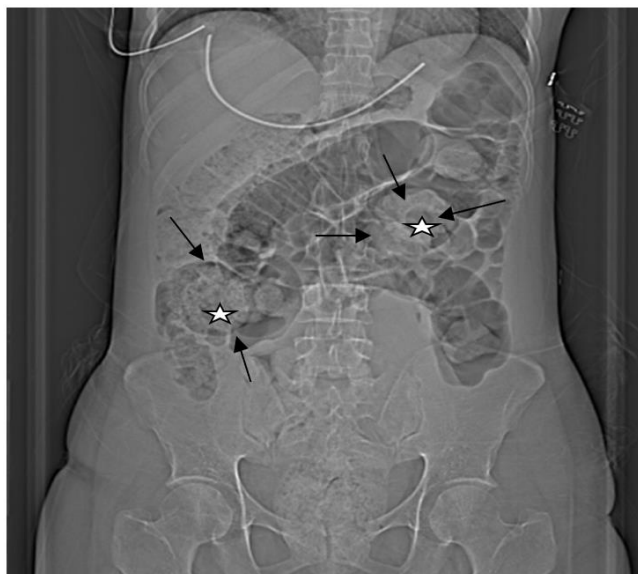
**Figure 1: Abdominal plain radiography**  
“Tic tac’ sign”: multiple uniform radiopaque round-shaped foreign bodies with sharp border and clear air-substance interface. (arrow)



**Figure 2: Abdominal plain radiography**  
‘Halo’ sign: Complete rim of blurred lucency around drug packet. (arrow)



**Figure 3: Abdominal plain radiography**  
“Double condom sign”: rim of air trapped between two layers of packing. (arrow)



**Figure 4:**  
**Black crescent’ sign: crescent of air around drug packet. (arrow)**  
**‘lucent triangle’ sign : air in the interface between drug packets or with bowel wall (star).**

#### **Computed Tomography (CT):**

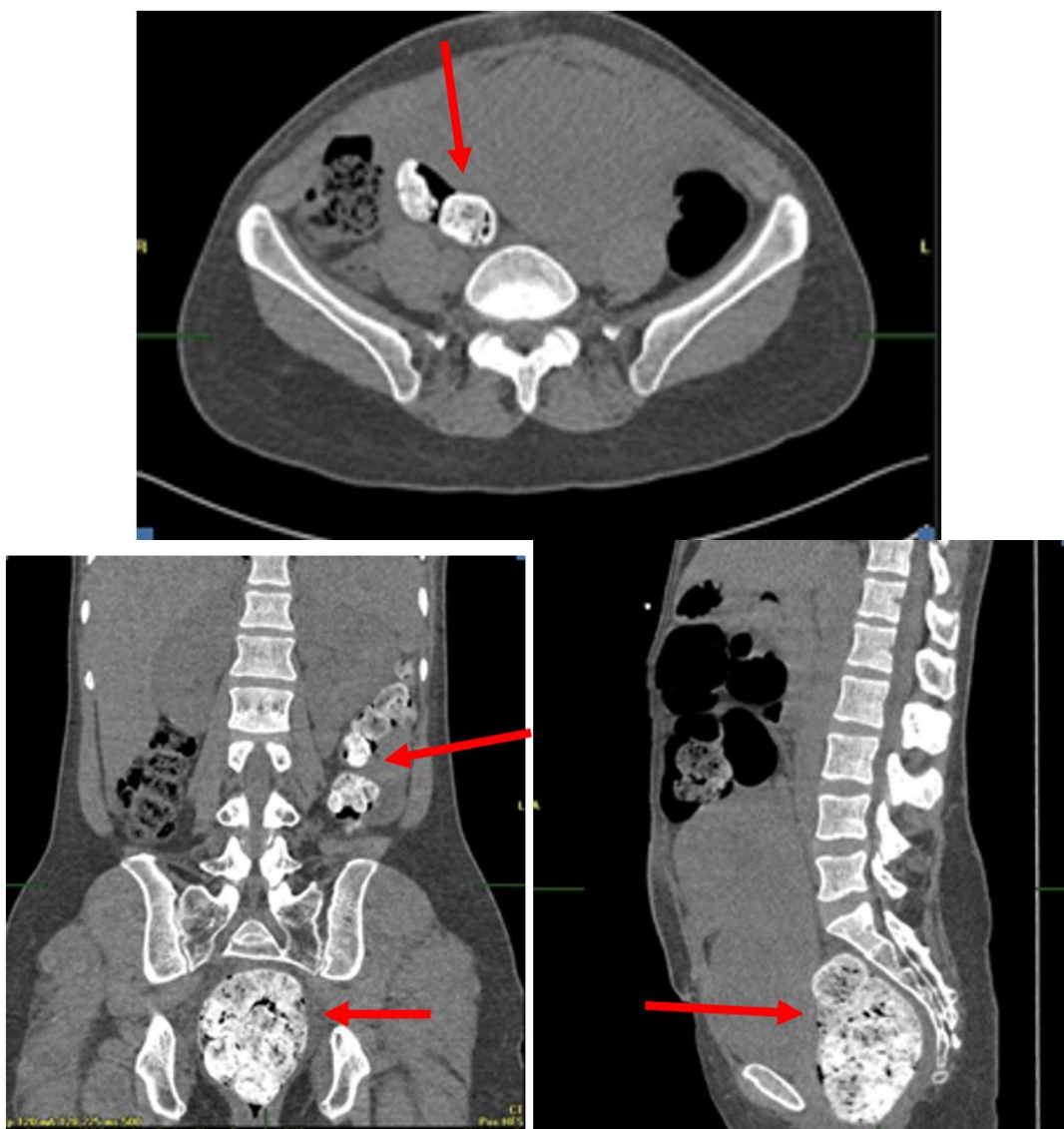
CT scan is the best modality of examination to detect ingested drug packets. Administration of oral or rectal contrast material may hide concealed packages because of similarities in density [5]. The most currently adopted protocol is abdominal and pelvic CT without intravenous or intestinal contrast. The lung window can be used to improve detecting concealed packets (**fig 5**). For imaging of symptomatic patients, CT is already the first choice modality when it comes to a symptomatic patient. The problem arises for the choice of screening

modality, taking into account the excessive ionizing radiation burden of CT scan, its cost and the legislation limiting the permitted radiation applied in most countries. The study of Poleti *et al.*, [6] considered Low-dose CT as the reference standard in screening of body packing.

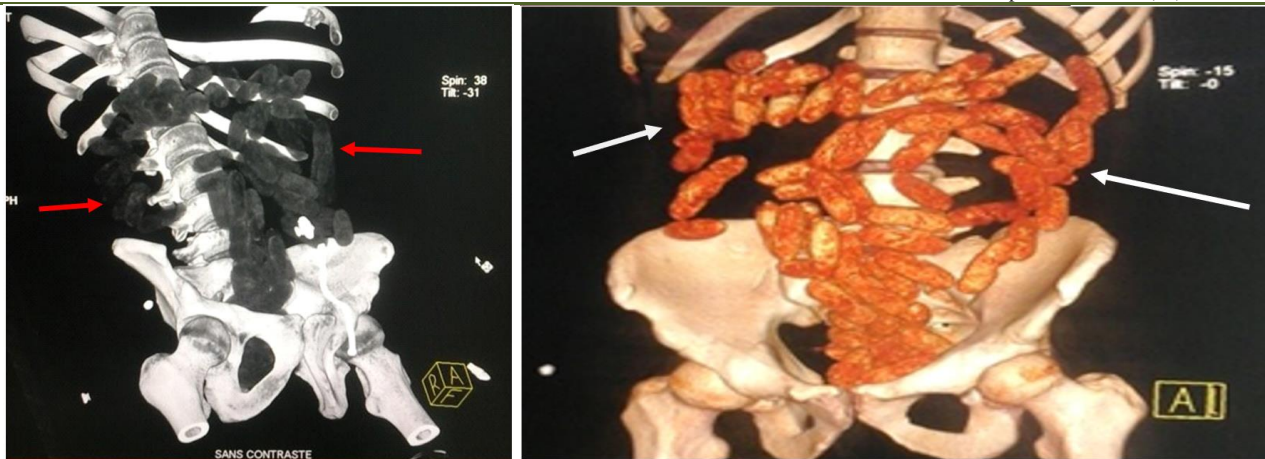
Yang and al report a sensitivity and specificity of CT at 100%. They conclude that negative screen on abdominal plain does not exclude body packing, and conventional CT can be a complementary tool in strongly

suspicious cases [18]. However, rare false negative of CT investigations were reported [18, 20, 21]. In our experience, we report one case of CT false positive, due to an overinterpretation of images of scybalas and misreporting of body packer diagnosis (**fig 6**). It was a clandestine patient from sub-Saharan Africa who presented for an intestinal pseudo obstruction after ingesting traditional herbal preparation with unreliable clinical history. The appearance of drug packets on CT depends on the type of drug, purity, and on the method of wrapping [2]. Solid body packets appear mostly as multiple, oval or round uniform hypo attenuated bodies incased into gastro intestinal tract (**fig 7**) [22]. Classic appearances such as the “tic-tac sign” or more rarely the rosette sign may be visible [5]. The estimation of density (UH) of the packets contents can help to distinguish

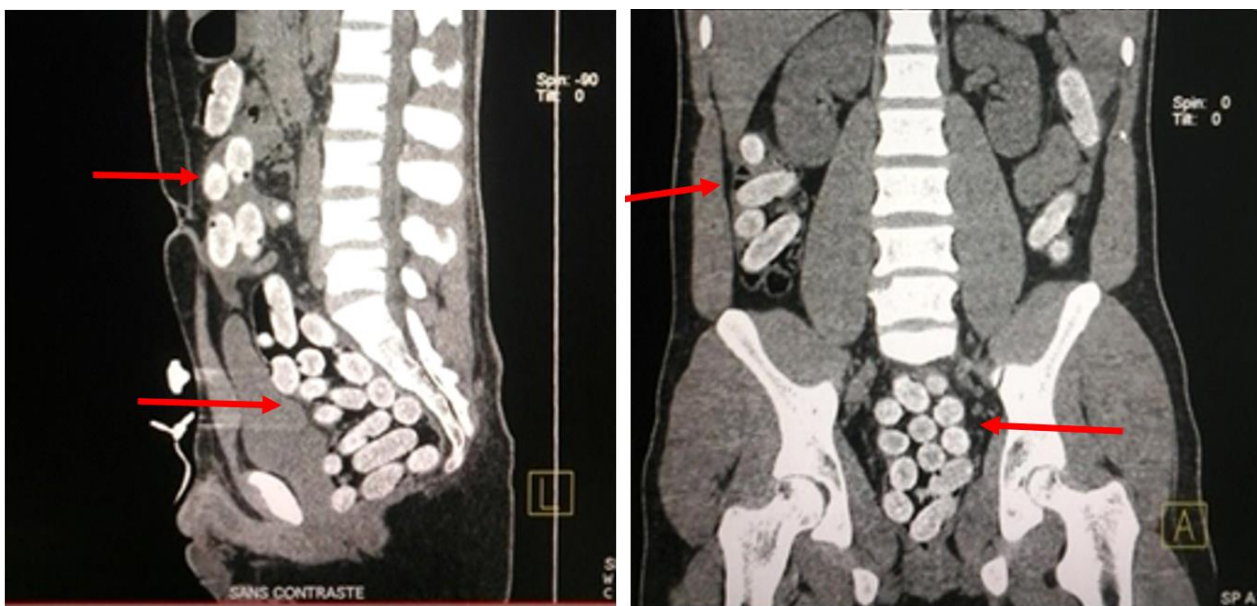
different type of drugs [23]. According to Hergan *et al.*, heroin, hashish and cocaine can be very similar and much denser than stool, or very different (heroin powder with air-like density, cocaine powder with water-like density) [15]. Another study demonstrated that hashish shows a density similar to bone (700HU), cocaine is less dense than fat (-219HU) and heroin is between the density of fat and air (520HU) [5, 23]. Concerning Liquid cocaine packets, the literature reported that CT scan is more reliable to rule them out [1, 10, 18, 24]. Oshry M. reported that liquid cocaine appears hyper dense compared to bowel content, with irregular and non uniform shapes on abdominal CT. They also described a sign suggestive to liquid cocain, called “jigsaw sign” which correspond to the gas captured in the interface between the packets [24].



**Figure 5: Abdominal plain radiography and axial coronal and sagittal CT reconstruction showing unshaped colo rectal foreign bodies (arrow) corresponding to scybalas after ingesting traditional herbal preparation.**



**Figure 6:** CT with volume-rendered reformat showing uniform solid cocaine drug packets distributed throughout the colon and rectum



**Figure 7:** Coronal and sagittal reconstruction CT showing multiple oval and round shaped foreign bodies with different density corresponding to impure solid form cocaine drug packets (arrows)

#### Ultrasound:

Ultrasound imaging is an available, non irradiant imaging tool which can be used safely to every suspected body packers including children and pregnant women. Ferhat Cengel *et al.*, [7] report that ultrasonography accurately determined the presence or absence of packs in 39 of 45 suspects. It was found to have a high sensitivity (91%) but a low specificity (70%) in suspected cases [7].

Drug packets, particularly solid ones can be easily recognized by ultrasonographic examination. They can be more easily visualized after digestive lumen fluid filling especially for those incasted in stomach or caecum .They may appear as a multiple typical high echoic uniform foreign body, with smooth linear or arcuate contours, generating a posterior acoustic shadowing [7, 25].

However, ultrasonography depends closely on radiologist skills and experience and on the equipment used. Furthermore, The presence of several pitfalls as scybala, intestinal gas (pseudocondom) and other foreign bodies makes the evaluation more complicated with a high risk of positive false [7].

#### CONCLUSION

Radiological features of the drug packets are in perpetual change following the evolution of smuggling techniques and “camouflage skills”.

The task of the radiologist becomes harder when he is faced with atypical situations such as low number of packets, heterogeneous and impure content or liquid filled packets.

Radiologists should be subtle and aware of the appearance of drug packets in a range of imaging modalities.

Although abdominal radiography and Ultrasonography are useful screening tools in the screening of body packers, they are limited by the low sensitivity.

Low dose CT seems to be more effective in the evaluation and management of patients, but inconvenienced by the radiation exposure.

Yet, regarding the medico legal consequence of missing or over detecting body packing, using low dose CT seems to be legitimate.

**Conflict of Interest:** The authors declare no conflict of interest.

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