Imaging unveils internal secrets of drug traffickers

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The proliferation of narcotics use over the past decades has been accompanied by a rise in drug smuggling. Meticulous vigilance by international customs and national authorities has led traders to adopt sophisticated and ingenious methods of drug transport. The smuggler's own body, especially the gastrointestinal tract, is now being used frequently as a vehicle for transporting narcotics. This intestinal concealment of illicit drugs, such as cocaine, marijuana, hashish, or heroin, can lead to complex health problems should the package contents leak.¹⁻⁶

Modern-day emergency departments increasingly need to deal with the dangerous side effects of both the "body stuffing" of street dealers and the "body packing" of drug traffickers. Radiology can play an important role in the identification of such packages and the management of these patients. Body packers make up 80% of the professional couriers, or mules, employed by international drug organizations. These individuals generally cross international borders on airplanes in the guise of tourists. Before embarking on a flight, they will systematically fill their digestive tract with large bags containing narcotics, each bag measuring between approximately 2 cm and 8 cm in maximum diameter. Smaller packets are swallowed while larger ones are inserted into the rectum. The form and size of drug packs will depend on their production method (handmade or mechanically fabricated) and how they are brought into the body (orally or rectally). All packages will generally be compact, safely packed, and carefully wrapped in containers designed to resist gastrointestinal transit without damage.⁵,⁷,⁸

Body stuffers, on the other hand, tend to be drug dealers encountered on the street. They are often drug users themselves or prostitutes. When unexpectedly confronted by the police, they will simply ingest what drugs they are carrying in an attempt to conceal them. This may involve either hastily swallowing the narcotics or introducing them into the vagina or rectum. The ritual is well known to both police and drug dealers as a means of concealing illegal substances and avoiding arrest.⁹

Body stuffing may involve any popular drug that is sold on the street, including hallucinogens and sedatives. The drug most commonly linked to body stuffing is cocaine.⁶ Cocaine is extracted from Erythroxylon coca, a plant native to the South American Andes. The leaves are harvested, dried, and then converted into coca paste, which is eventually used to make white, crystalline cocaine hydrochloride. It takes about 100 kg of coca leaves to produce 800 g of cocaine.¹⁰ Cocaine powder is typically pressed into a tight ball-shaped object for transport. Crack cocaine, also linked to body stuffing, is a chemical derivative of cocaine and is much cheaper and easier to use. Generally, it is absorbed by smoking in cigarettes or special pipes, and it produces a more intense and rapid effect on the drug user than the powder, which is mostly snuffed.

Drug packages ingested by body stuffers will typically be handmade and contain a single dose of the narcotic. Because the packages will have been intended for street sale, they are unlikely to be well-suited to gut transit. A packet of cocaine 8 to 10 mm in diameter, for instance, will contain approximately 1 g of cocaine powder of variable concentration (5% to 20%). The powder will most likely have been wrapped loosely in cellophane paper, condoms, and/or aluminum foil.¹¹,¹²

If a package of cocaine ruptures or leaks within the intestine, the drug will immediately be absorbed by the intestinal mucosa. The resulting toxicity can affect almost any of the body's organs. Signs of cocaine intoxication can include profound stimulation to the central nervous system with psychosis and repeated grand mal convulsions, ventricular arrhythmias, respiratory dysfunction with Cheyne-Stokes breathing, respiratory paralysis, hyperthermia, and even coma. Death from cocaine intoxication can occur from doses as low as 30 mg. The minimum lethal dose from orally administered cocaine is 1.2 g.¹⁰ Body packers can ingest up to 25 cocaine-filled packets simultaneously. Sudden leakage of packages can, consequently, be fatal.⁵,¹³ Emergency room
doctors treating body stuffers must assess the number of cocaine-filled packets they have ingested as a matter of urgency. This will indicate the exact risk of cocaine toxicity, allowing appropriate emergency management until all packages have been eliminated. It will also provide legal proof that the individual is in possession of illegal narcotics.

**DIAGNOSTIC OPTIONS**

Plain-film abdominal x-ray is the most commonly used radiological tool for the detection of narcotics-filled bags ingested by body packers.\(^2,5,7,8\) The sensitivity of conventional radiography to these low-contrast containers is quite variable, ranging from 40% to 90%.\(^2,5,7,8,12,14-16\) The containers' density can vary from radiopaque to radiolucent, and structures may be surrounded by gas halos.\(^14\) Most authors still nonetheless agree on the merits of using this technique for the management of body packers.\(^2,5,15\)

Diagnostic and therapeutic strategies for body stuffers remain controversial. Abdominal x-ray tends to be far less helpful than with body packers because body stuffers will have ingested fewer and smaller packages of drugs.\(^9,12,15,17,18\) More sensitive diagnostic modalities are needed that are still rapid, efficient, objective, reproducible, and noninvasive.

Abdominal ultrasound has been recommended as a valuable tool for the assessment of drug packages ingested by body packers.\(^2\) Packages appear as oval or round hyper-echogenic structures with dorsal echo extinction within the abdomen. Ultrasound has a sensitivity of just 60% for the detection of large bags, though. Its ability to detect the small cocaine-filled packets ingested by body stuffers may be even lower, perhaps no better than that exhibited by conventional radiography.

One way to avoid false-negative abdominal x-rays in body packers is to perform the radiographic examination after oral administration of hydrosoluble contrast. This has resulted in a sensitivity of 92% to 100% and a specificity of 88% to 100%.\(^3\) The authors of that study observed surprisingly good patient acceptance. Only one out of 23 body packers refused the contrast agent. This reluctance was short-lived, and the individual later accepted the contrast. The cocaine packages visualized in this study measured around 5 cm at maximum diameter. The good results may consequently not apply to the investigation of packages 1 cm in diameter ingested in haste by street dealers.

The whole gastrointestinal tract should ideally be screened to exclude the presence of cocaine-filled packets or to count the number of packages ingested by body stuffers. Performing this type of examination with either ultrasound or conventional digestive studies would be cumbersome and time-consuming.

MRI has been suggested as an option for screening suspected body stuffers.\(^8\) This does not seem to be an appropriate solution given the long duration of data acquisition. The required patient compliance is unlikely to be achieved. MRI is rarely available on-demand, and it is associated with higher costs than other diagnostic modalities. Exploration of the whole intestine would definitely require bowel preparation to prevent image interpretation being complicated by the presence of stool, which can have a heterogeneous appearance on MRI.

Spiral CT has very good sensitivity for the immediate detection and identification of various nonmetallic foreign bodies, such as glass, wood, or plastic, that are introduced accidentally into the body. Yet only three published cases have reported the use of CT for the detection of body stuffers' cocaine-filled packets.\(^1,15,19\) Reluctance to use CT on these individuals may have grave consequences. One body stuffer who was under close medical observation, but who had not undergone imaging, died when cocaine from an ingested package leaked into the small bowel. The presence of the package was only detected postmortem.\(^13\)

We introduced a multislice CT technique into our emergency department five years ago for the evaluation of suspected body stuffers. It has proven to be extremely useful. In a phantom study, we can demonstrate the diagnostic value of this method for visualizing cocaine-filled packets within simulated stool with good interobserver agreement among four experienced abdominal radiologists. Sensitivity, specificity, and positive and negative values for detection of two different types of cocaine-filled packets were 95.6%, 100%, 100%, and 62.5%, respectively.\(^20\) Our MSCT protocol does not require intravenous contrast or bowel preparation. It has now become our method of choice for this indication.

**CT FEATURES**

Cocaine-filled packets typically appear on CT with a round or oval high-attenuating center (cocaine powder) surrounded by a thin halo of air. The air will have been trapped within the folded packing material (mostly cellophane) during wrapping.\(^13\) We find that the density of the central cocaine
varies between 150 and 250 HU and may even reach the density of body stuffers' stool. Pure cocaine generally has a low attenuation on CT. Cocaine mixtures, such as those ingested by body stuffers, have a higher attenuation owing to the drug's reduced concentration and the components added for dilution.\textsuperscript{1,5,8,15} The cocaine's density may also vary according to the tightness of packing and the type of wrapping material.

An air-solid interface is already recognized as the most relevant sign of drug-filled condoms in the intestinal loops of body packers on plain-film x-ray.\textsuperscript{2,7} This sign is referred to as the "double-condom" on conventional radiography. We now recognize this as a key CT feature for intestinal cocaine-filled packets in body stuffers (paper under peer review).\textsuperscript{20}

**PRACTICAL APPLICATION**

At our institution, we read these images on the workstation in lung kernel rather than soft-tissue kernel to aid detection of cocaine-filled packets in the bowel loops. It is important to be aware that scybala, which occur frequently in the stool of body stuffers, may demonstrate an air-solid interface with a high-attenuation center, too.

Our own experience and published evidence suggest that unenhanced CT is sufficient to visualize any cocaine-filled packet in the gastrointestinal tract.\textsuperscript{1,15} If any other medical conditions are indicated, or cocaine intoxication due to package leakage has occurred, then intravenous iodinated contrast may be necessary.

CT can be performed only with the body stuffer's consent. Lack of patient collaboration during data acquisition can lead to motion artifacts, making image interpretation difficult. We seldom encounter a complete refusal to undergo CT. This high compliance rate may be due to individuals' genuine fear of medical consequences if the package leaks.

We perform unenhanced MSCT shortly after a body stuffer arrives at the emergency department. If any cocaine-filled packets are detected, then the individual must be kept under close clinical observation for the following days, with strict control of his or her defecation and stool until the drug packets are evacuated. We try to give oral enemas to accelerate gut transit if the individual agrees. We do not recommend using surgical or endoscopic procedures to remove cocaine-filled packets owing to the high risk of leakage associated with these interventions.\textsuperscript{4,15}

Cocaine-filled packets generally remain intact during intestinal transit, in our experience. Symptoms of cocaine intoxication seldom occur. A control CT scan may be performed before a body stuffer is discharged to confirm complete evacuation of all drugs initially identified. Our conservative clinical approach is confirmed by other institutions.\textsuperscript{9,17,20}

Treatment decisions for body stuffers depend on the presence or absence of clinical symptoms of cocaine poisoning, the length of time elapsed since packet ingestion, the location of the drug packet(s) within the digestive tract, and the likelihood of rupture or cocaine leakage. The observed packet should be removed immediately if signs of cocaine toxicity are seen. An endoscopic approach is preferable to avoid possible fatal complications.\textsuperscript{14}

In conclusion, unenhanced MSCT without prior bowel cleansing can be recommended for the straightforward detection of ingested cocaine-filled packets in body stuffers. It not only shows practitioners the quantity of ingested narcotics, guiding further emergency management, but it also proves the possession of any illicit drugs. The main diagnostic feature we look for is an air-solid interface. This represents a peripheral halo of air trapped within the packing material, surrounding the spherical center of highly attenuating cocaine powder.

**References**


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Disclosures:

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