Diagnostic Radiographic Findings in Body Packers: A study of 15 Cases in Kuwait
S Kumar, A Deena, S Raj, M Kukkady

Introduction
The transportation of illicit drugs by internal concealment has since evolved into an important means of international cocaine and heroin smuggling, with accounts of body packing reported in virtually every country in the developed world.\[1\]

Body packers smuggle illicit drugs mainly by swallowing drug packets. However, insertions of packets into the rectum and vagina for concealment have also been reported \[2\,3\,4,5\]. They have been variously described as Couriers, Mules, Packers. \[4,6\]. In addition to transporting cocaine and heroin \[2\], body packers may also smuggle amphetamines, “ecstasy”, marijuana, or hashish. Transportation of illicit drugs through such internal concealment has now become a widespread modus operandi for international drug smugglers \[1\], and has shown increased frequency and sophistication\[4\].

Kuwait, too, is no exception and is experiencing an increasing number of body packers traveling in from neighboring countries. This paper is the first study done on body packers in middle east and the first ever anywhere dedicated solely to evaluation of the radiological findings seen in body packers.

Material and Methods
15 males suspected of being body packers by the expert custom officials at Kuwait international airport were referred to the surgical casualty of Farwania Hospital for further diagnostic evaluation and management during the period from March to June 2003. All underwent initial radiological evaluation with plain supine and erect radiographs of abdomen and pelvis and when suggestion of presence of drug packets was seen they were labeled as suspected. All of these suspected body packers had irrigation with polyethylene glycol-electrolyte lavage solution in special isolated surgical wards. The stool production of the suspects was continuously visually monitored and searched for the presence of drugs during detention. They were kept till all the drug packets were evacuated as known by repeated radiographs or 3 consecutive stool sample showed absence of drug packets.
RESULTS

Out of the 15 all male suspected body packers ranging in age from 21 to 44 years, 12 were found positive on plain radiographs of abdomen and pelvis, one was found negative while 2 were equivocal due to heterogeneity of the drug packet density in spite of the air crescent sign being positive. Special signs enumerated in observation table 1 pointed to the presence of drug packets on plain radiographs. All of the body packers had multiple drug packets anywhere from the stomach to the rectum.

The shape was mostly (50%) sausage like or round the later being due to the same drug packet being seen end on, 25% of the body packers had ovoid shaped packets and one (8.3%) of the packers had a large banana shaped packet and its irregular outline pointed to it being hand made while the others (91.6%) had mostly uniform shape and size hence were machine made. The commonest sizes of the packets were 4x2cm and 5x2cm (33.3%).

The density on plain radiographs was found same as that of....
soft tissue in 75% of the body packers, one of them had density less than soft tissue and varying density suggesting differing composition of the illicit drugs was seen in two of the packers.

Most (80%) of the packers had drug packets which showed air crescent, this particular radiographic finding was noted at the margin of packets when it was in contiguity with bowel wall or another packet as the soft tissue density of these structures gave sufficient contrast with the air trapped in the wrapping of packet, help of a magnifying glass was taken in some (33.3%) of the cases to pick up the air crescent sign. The drug packets were of homogenous density in most [91.6%] of the cases.

Rosette like finding was seen in 16.6% of the cases this was due to air trapped in the knot at the end of the packet. Only one of the cases had a complication from concealing the drug packet, he had a grossly dilated stomach due to gastric outlet obstruction and the drug packets had to be surgically removed. In one of the cases an erect radiograph showed drug packets in the pelvis in addition to the ones in abdomen seen on supine film.

Hence plain radiograph in imaging of body packers has a very high sensitivity of 100% while the specificity is quite low at 33.3%, hence proving a very ideal screening tool.

**Figure 2**
Figure 1: Evacuated drug packets of uniform size. These drug packets are densely packed into several layers of latex sheets and sealed with outer wax coating and plastic food wrap materials to alter the radio density in an attempt to limit the risk of detection.

**Figure 3**
Figure 2: Magnified view of a evacuated single packet

**Figure 4**
Figure 3: Drug packets of soft tissue density in the fundus of the stomach
Figure 5
Figure 4: Close up view of the pelvis region showing single large banana shaped drug packet in the recto-sigmoid area.

Figure 6
Figure 5: Close up view of the pelvis region showing multiple large sausage shaped drug packets in the recto-sigmoid area.

Figure 7
Figure 6: Close up view of the pelvis region showing multiple round shaped drug packets in the rectum area.

Figure 8
Figure 7: Distended stomach loaded with drug packets of soft tissue & less than Soft tissue dentistry.
Figure 9
Figure 8: Drug packets of less than soft tissue densities in the stomach region.

Figure 10: Radiograph showing drug packets with internal tiny specks of high densities in the colonic region.

Figure 11
Figure 9a: Radiograph taken after 24 hrs of admission showing reduction in no. of drug packets.

Figure 12
Figure 9b: Radiograph showing drug packets of soft tissue densities in the descending colon & rectum.
DISCUSSION
The gastrointestinal tract is often used to smuggle drugs, very occasionally these cause complications such as obstruction or packet perforation which have very characteristic features [1, 6] and would not require any great effort in making a diagnosis. This is however not often the case and most (88.2%) have no significant symptomatology [5] and due to the nature of the offense, the history frequently does not provide clues [4]; even the physical examination is negative except for those who smuggle the drug packets by pushing into their vagina or rectum [6]. Imaging and the radiologist play an essential part in the diagnosis and management of these patients. [4, 6]

Plain abdominal X-ray film has been used to detect the drug containers with varying but admirable rates of success. This technique leads to a correct identification of the drug packets in 83 to 92% of cases [3]. This accuracy was reported in another series as being 75 to 95% [7]. Accuracy in our study was found to be 86.6% and sensitivity 100% this contradicts belief by Hahn et al who describes plain abdominal radiograph to be a known imperfect screening tool, which is widely used for this purpose, primarily out of convenience [1].

On a plain radiograph the packets are usually detected as multiple, well defined homogenous oval or oblong isodense packets usually surrounded by a crescent of air (double condom sign) [6]. Each packet is usually wrapped in four layers of individually tied latex, with a layer of cellophane in...
between. Double condom sign is formed when air trapped between the layers of condom renders the drug packets more visible due [1,1]. Presence of air crescent was considered the utmost finding for increasing the sensitivity in detecting drug packets and we boast of a sensitivity of 100% , however it is to be realized that this finding can even be seen with fecal mater in fact our study revealed a false positive rate of 66.6 % among the cases that were negative . Other studies such as by Chaljub et al describe the ‘‘double condom sign,’’ as classic sign is which is due to air surrounding the different latex layer resulting in a crescent-shaped halo possibly due to improper packing [3] this sign has also been described as radiolucent small bands [1]. This particular sign was usually well appreciated with naked eye and in 4 of the cases we found use of a magnifying glass significantly helped in confirming or detecting this sign. The use of a magnifying glass hasn't been previously described to pick up this sign.

On plain radiographs of the abdomen packets appear as homogenous radioopacities within the radiolucent air displacing the usual appearance of feces, these foreign bodies are usually regularly shaped and have same dimensions [4]. Uniformity in the appearance of drug packets with smooth outline confirms use of machine in the making of these packets which was seen in all our cases except for one case who had a single large one in the rectum, this had irregular margins and showed an air crescent. The make like we observed has previously not been inferred or demonstrated them.

Rosette like finding represents air trapped in a knot when the condom is tied [1,1]. This finding in our series was seen in 16.6% of cases. This sign had 100% specificity in this series however only 16.6% of the cases had this finding.

The drawback of plain radiograph is exposure to radiation, availability, and costs. Also the presence of a radiologist for the interpretation is often required [5].There are few reports on the use of ultrasound which is non ionizing and has low recurring cost, this has a sensitivity (97%) approaching that of plain radiograph (100%) [6,7].

An age range of 21 to 44 years was found in our study this correlated with the age group found by Meijer and Bots in their series (19–45 years) [4,5]. While others found age range more variable [pidoto et al-18-59 years] [1,1] , the later series also had a good proportion of females as drug carriers while our study found them to be exclusively males.

The commonest size of the drug packets found was 2x4 cm which was almost same as study of meijer and bots who found the commonest size of 3x4 cm [4,5] and pidoto et al who found the commonest size to be 3x5cm [1].

Ultrasound studies reported drug packets being more easily detected when in the stomach as they are surrounded by fluid [6,1]. The location of drug packet where ever in the gastrointestinal tract made no difference in the ability of radiograph in detecting them unlike with ultrasound, and there appears no importance of the location of drug packets except for when it causes obstruction.

The multiplicity of the drug packets is of diagnostic value in ultrasound as reported by Meijer and Bots [1,1]. This fact was found in our study too as the confidence level in diagnosis was a found to be much higher in the presence of multiple drug packets.

Evacuation of bowel by irrigation with polyethylene glycol-electrolyte lavage is said to be suboptimal and cases of retained packets despite hours of aggressive lavage are reported [5,8] hence in our study the criterion of following up by plain abdominal radiograph or until 3 stool samples were negative was used.

The importance of taking supine and erect radiographs was felt in our series as taking two different views increased the confidence level of making the diagnosis for the Radiologist and besides in one of the cases the supine radiograph did not detect the drug packets while the erect radiograph clearly demonstrated them.

Most of the body packers evacuate the drugs spontaneously and no complications are encountered. The complication when occurs invariably is obstruction [3,3] this has been reported most commonly to occur at the terminal ileum in some series [5] while others report gastric outlet obstruction as being more common (1.9%), compared to 1.2% for ileal obstruction [5,5]. In our series one of the packers had complication of gastric outlet obstruction for which laprotomy had to be done.

When the routine radiograph finding is ambiguous a single dose of water soluble contrast is given and its progression through the gastrointestinal tract is followed by repeated radiographs [5,5]. The sensitivity and specificity of this method is superior to plain radiographs and there are no side effects [5,5].
CT scan has been recommended as a suitable replacement however, there are no large controlled studies that prove its value however, in one reported series, only 3 of 5 known body packets were identified with abdominal CT scan. The reason could be negative attenuation values of some of the drugs which makes it difficult to differentiate from intraabdominal fat. Magnetic resonance imaging is unable to visualize the drug substances at all, probably because they contain minimal amounts of water.

CONCLUSION

Plain radiograph of the abdomen is the primary imaging modality of choice for evaluation of suspected body packers. The presence of air crescent sign along with uniformity, homogeneity, smooth outline and multiplicity of the drug packets in suspected body packers are valuable radiological diagnostic features.

Drugs are being smuggled all over the world and as the methods employed by the traffickers continue to increase in creativity, sophistication, and ingenuity, the emergency department physician and the radiologist must continue to be vigilant with a high degree of suspicion. Their practice also needs full cooperation of airlines, airport, customs officials and Justice departments.

There are places where in the suspected body packers are imprisoned for numerous days while their stool sample are monitored for presence of drug packets this way of managing such cases is greatly improved upon by presence of a imaging modality of high sensitivity which helps exclude the non-packers hence avoiding legal implications of detaining innocent individuals for prolonged period. Other issues such as a small dose of radiation and the violation of the integrity of the human body while examining or imaging appear insignificant compared to the benefits plain radiographs has too offer.

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Participating investigators: Dr Vinoo Jacob, Dr Mustafa Shawaki: collected data

CORRESPONDENCE TO

Dr. Sinha Nitin Raj, X ray Dept, Farwaniya Hospital, P.O Box no. 18373, Kuwait-81004, KUWAIT E mail add: sinha9nitin@gmail.com Phone: 00965-6141437 Fax: 00965-4892752

References

Author Information

Surana Santosh Kumar, MD, FFRCSI
Department of Radiology, Farwania Hospital

Al-Refae Deena, ABR, FRCR[C]
Department of Radiology, Farwania Hospital

Sinha Nitin Raj, MD, FRCR
Department of Radiology, Farwania Hospital

Mohamed Ashfaque Kukkady, DMRD, DNB, FRCR
Department of Radiology, Farwania Hospital