

Pekka J. Karhunen,<sup>1</sup> M.D., Ph.D.; Hannu Suoranta,<sup>2</sup> M.D.,  
Ph.D.; Antti Penttilä,<sup>1</sup> M.D., Ph.D.; and  
Pekka Pitkäranta,<sup>2</sup> M.D.

## Pitfalls in the Diagnosis of Drug Smuggler's Abdomen

---

**REFERENCE:** Karhunen, P. J., Suoranta, H., Penttilä, A., and Pitkäranta, P., "Pitfalls in the Diagnosis of Drug Smuggler's Abdomen," *Journal of Forensic Sciences*, JFSCA, Vol. 36, No. 2, March 1991, pp. 397-402.

**ABSTRACT:** Narcotics "body packing" can be detected in abdominal X-rays by the ring shadow caused by air trapped in the packs. In a series of 82 cases admitted for abdominal X-ray in Helsinki, Finland, in 1982 through 1988, we encountered 9 (11.0%) true positives, 3 (3.6%) false positives, and 1 (1.2%) false negative. The false positives were due to the constipation often associated with the narcotics abuse. The false negative X-ray diagnosis was attributable to an inexperienced radiologist. False negatives may also be associated with packets containing marijuana, packs with few wrappings, aluminum-foil coated packs, and machine-packed narcotics. Searching for trapped air in radiographs, repeated X-raying by an experienced radiologist, use of computed tomography, or combined urinary drug screening may be applied to diminish false findings and to avoid unnecessary arrest for the purpose of fecal screening over several days.

**KEYWORDS:** criminalistics, toxicology, radiology, drug smuggling

Narcotics "body packing," first carried out by prisoners, is a popular method of passing illegal drugs across national borders [1,2]. The narcotics are wrapped in condoms, plastic bags, or aluminum foil. Packs hidden in the rectum usually contain marijuana and are easily detected by manual examination [2]. Heroin and cocaine are most commonly swallowed as small packs of 3 to 6 g, which are usually wrapped in several layers of latex [1]. During wrapping, air may be captured in the packs [3]. Gas may also be generated in the packs by fermentation of the plant material at body temperature [4] or may pass into condoms if the rubber is degenerating [3]. Swallowed packs can thus be detected by plain abdominal X-ray, in which one looks for oval or round soft tissue densities highlighted by a gas halo [5]. The density of narcotics is not essentially different from that of stools, though narcotics may appear as slightly more dense radiopaque shadows. Both false negative [4,6-8] and false positive [7] abdominal X-ray findings are reported in the literature.

In this paper, the difficulties and differences in X-ray diagnoses of drug smugglers are discussed in our own material of 82 cases.

Received for publication 9 April 1990; revised manuscript received 25 May 1990; accepted for publication 30 May 1990.

<sup>1</sup>Senior lecturer and professor, respectively, Department of Forensic Medicine, University of Helsinki, Helsinki, Finland.

<sup>2</sup>Senior lecturer and staff physician, Department of Radiology, University Central Hospital of Helsinki, Helsinki, Finland.

## Material and Methods

The main entry point of illegal drugs into Finland is the capital, Helsinki (with a population for the city and surroundings of 1.1 million), on the southern coast. Since 1982, all suspected drug smugglers arriving by air or ship have been examined at the request of the customs authorities at the Department of Forensic Medicine, University of Helsinki [2]. Finnish law permits medical examination of persons suspected of crime without their consent "if it does not cause undue discomfort." The medicolegal examination of body cavities of the suspect by a physician is, in practice, performed only with the consent of the examined, who faces as his alternative an arrest to allow fecal screening for a maximum of seven days. In these circumstances, the refusal rate has been only 1.2%. Manual examination of the rectum and vagina, sigmoidoscopy, and rectal lavage are included [2]. When there has been a strong suspicion of drug smuggling but negative other findings, the suspect has been admitted for abdominal plain radiography, which has been carried out at the Department of Radiology of the University Central Hospital of Helsinki.

## Results

Between 1982 and 1988, a total of 581 suspected smugglers were admitted for medicolegal examination by customs authorities in Helsinki. Concealed narcotics were found in 70 cases (12.0%). The proportion of positive diagnoses decreased from 13% during 1982 through 1986 to 8% in 1988. Most of the positive cases were diagnosed manually or by sigmoidoscopy [2].

### *Abdominal X-Ray Findings*

Of the suspected smugglers, 82 (14.1%) cases were admitted for abdominal X-ray, among them all 7 (1.2%) who refused manual examination. Of these 82 cases, 12 (14.6%) were considered positive and 70 (85.4%) negative by abdominal X-ray. Nine (75%) of the positive cases were found to be true positive (Fig. 1), and 3 (25%) proved to be false positive. Of the negative cases, 1 turned out to be false negative. Thus, true positives were detected in 11.0%, false positives in 3.6%, and false negatives in 1.2% of our series.

### *False Positive Cases*

*Case 1*—A 24-year-old Finnish male was admitted for medicolegal examination because the custom authorities at the airport found plastic bags filled with gray powder in a hidden safe in his suitcase. Manual examination of the rectum and sigmoidoscopy produced negative results. The abdominal X-ray revealed suspect foreign bodies without ring shadow (Fig. 2) and he was arrested. He passed several stools over a few days without a sign of narcotic packs. Later it was discovered that the powder was sand. He made a complaint against the customs authorities. The reason for transporting concealed sand remained unclear.

*Case 2*—A 25-year-old Finnish male arrived in Helsinki by air. He had 0.7 g of hashish in his pocket and 4.1 g in the glove compartment of his car. At medicolegal examination, manual exploration of the rectum produced negative results. Sigmoidoscopy could not be carried out properly because of muscle spasms. The abdominal X-ray revealed crescent-shaped soft tissue shadows, without gas halos, which could have been foreign bodies in the descending colon. He was arrested. Nineteen hours later, after repeated abdominal X-rays, the descending colon had cleared, but several small round radiopaque shadows were observed in the sigmoid colon. Meanwhile, he had passed firm stools. Repeated manual examination and a rectal lavage produced negative results. As a result of the X-



FIG. 1—Plain abdominal radiograph showing multiple narcotics packs with gas halos.

ray findings, however, he was arrested for a second day. Later on in the same evening he again passed hard stools. In the next day, 40 h after the first examination, suspect bodies were still seen in radiography. Computerized tomography (CT) results were, however, completely normal. Manual examination and rectal lavage disclosed hard stool particles in the ampulla. The suspect was released.

*Case 3*—A 24-year-old Gambian male was brought directly from the airport and admitted for medicolegal examination. Manual examination of the rectum was negative, but he refused sigmoidoscopy. In plain radiography, several 1 to 2-cm round, soft tissue shadows, suspect for foreign bodies were seen, and he was arrested. The following day, after repeated abdominal radiographs, the finding was again considered to be feces particles associated with constipation.

#### *False Negative X-Ray*

*Case 4*—A 31-year-old Swedish male arrived in Helsinki by air from India via Moscow. He behaved in a confused manner at the airport and was found to be carrying a 3-g pack of heroin wrapped in a condom in his pocket. Recent injection marks were visible on his arms. Manual examination of the rectum, as well as sigmoidoscopy produced negative results. An abdominal radiogram was considered to be negative by the radiologist on duty. The confusion of the suspect was explained by his labile diabetes. On the following morning, a reexamination of the films by an experienced radiologist disclosed multiple soft tissue densities surrounded by a gas halo. At the preliminary analysis of the films these were thought to represent feces [9]. The suspect had not been released, and fecal



FIG. 2—Multiple smooth radiopaque densities without gas halos, associated with constipation, misdiagnosed as narcotics packages.

screening revealed 89 packs, each containing 2.5 to 3 g of pure heroin. The outer envelope of some of the narcotics packs had been ruptured.

### Discussion

All three of our false positive abdominal X-ray findings were caused by constipation. Similarly, Rauber and Muller [7] found three false positive cases (9.3%) among 32 suspects but did not consider the reasons. Hard stools may be misdiagnosed as narcotic packs as they present themselves as multiple radiopaque soft tissue shadows of 1 to 2 cm in diameter [9,10]. The oblong, cigar-like, oval or round shape, as well as the tendency of narcotics packs to lie parallel to each other may be used for differential diagnosis. The packs usually reveal the "double condom sign" [11,12]. The expertise of the radiologist is of paramount importance for the right diagnosis [7]. Well-demarcated and compact pieces of feces can be misinterpreted as narcotics since constipation is not a likely diagnosis in the young age group in which most smugglers are found. Abuse of opiates, codeine, or morphine causes constipation by slowing down the propulsive peristalsis of the bowel. Parasympatholytic drugs, used by smugglers during long flights to inhibit expulsion of drug packs, also cause constipation by decreased colonic motility.

Other rare foreign bodies uncommonly detected in plain radiograms of the abdomen

can cause diagnostic difficulties. In addition to narcotics packages, bezoars of the stomach may obstruct the gastrointestinal tract. Colonic foreign bodies lodged in the appendix, barium in the diverticula, and foreign body granulomas may be easily differentiated from narcotics [13]. Even soft-tissue polyps may mimic multiple narcotics packs [14]. Psychiatric patients sometimes swallow foreign bodies, but usually these are hard items [6].

We have no data on the true number of false negative findings in our series. Only 82 (14.1%) of the 581 suspects were subjected to X-ray studies, with 1 proven false negative finding. A negative abdominal X-ray usually leads to release of the suspect. For every smuggler caught, unknown numbers may thus evade detection. Rauber and Müller [7] also found 1 false negative in their series of 32 cases. McCarron and Wood (8) reported that small hard packets of cocaine, wrapped in aluminum foil and overwrapped with three to five layers of tubular latex were not seen in abdominal X-rays. They even reported a high number of false negatives (16 out of 48) in their series. Pinsky et al. [5] detected in 1 of their cases five lucent ring shadows and two radiopaque shadows without a ring shadow, which were found to be packs containing, respectively, morphine and hashish. They radiographed experimentally a condom ball with a varying number of layers in a glass of water and found that, the fewer the layers of condom, the less obvious was the lucent ring shadow. Nevertheless, most radiopaque narcotics packs without a gas halo reported in the literature have been hashish balls. Hashish, as a cheaper narcotic, may be packed less thoroughly and is thus prone to lack ring shadow and present itself as a soft-tissue density [5,6], impossible to distinguish from feces balls.

Techniques developed in narcotics "body packing" would also explain the absence of a ring shadow in some cases. Caruana et al. [10] described ingested packets which consisted of 3 to 7 g of cocaine wrapped in cellophane, followed by several layers of latex bound with nonabsorbable surgical ligature. Many of the packets seemed to be machine packed.

Computerized tomography (CT) has been found to be a more accurate method of revealing drug-filled packs because of its high contrast resolution and the absence of projections of overlapping structures on transverse sections. Keresshot et al. [15] described five drug smugglers of whom three had normal or near normal abdominal X-rays. CT revealed 81 oblong balloons in the first, 47 in the second, and a rectum completely distended and filled with balloons in the third of these cases. In our case, CT excluded the presence of packs suspected in plain X-rays. Thus a few slices with CT may be useful in cases of doubtful findings. Sonography is of no value [7].

Recently, Gherardi et al. [16] suggested investigation of the urinary concentration of narcotic drugs for screening of narcotics "body packing." The presence of drugs in urine may result from contamination on the outside of the packets when they are swallowed [16,17] or leaking through semipermeable wrapping. Thus, in cases with uncertain positive or negative abdominal X-rays, urine drug screening may provide additional data.

## Conclusions

In conclusion, constipation, not infrequently detected among suspected narcotics "body packers," was the main reason for false-positive radiological findings in our series. Constipation was probably associated with the use of narcotic or parasympatholytic drugs. Feces particles exhibit increased density in X-rays, mimicking narcotics packs, but lack the "double condom sign" caused by air trapped in the packs. However, the less thoroughly packed narcotics as well as machine-packed drugs may lack the "ring" shadow, which makes them indistinguishable from pieces of feces. This may in turn lead to a false negative diagnosis. Repeated plain radiographs by an experienced radiologist, the use of CT, or urinary drug screening would be helpful in diminishing false positive or negative findings and unnecessary arrests for fecal screening.

## References

- [1] Wctli, C. V. and Mittleman, R. E., "The 'Body Packer Syndrome'—Toxicity Following Ingestion of Illicit Drugs Packaged for Transportation." *Journal of Forensic Sciences*, Vol. 26, No. 3, July 1981, pp. 492–500.
- [2] Karhunen, P. J., Penttilä, A., and Panula A., "Detection of Heroin 'Body Packers' at Helsinki Airport," *The Lancet*, Vol. 1, No. 8544, May 1987, p. 1265.
- [3] Deitel, M. and Syed, A. K., "Intestinal Obstruction by an Unusual Foreign Body," *Canadian Medical Association Journal*, Vol. 109, No. 3, Aug. 1973, pp. 211–212.
- [4] Dassel, P. M. and Punjabi, E., "Ingested Marihuana-Filled Balloons," *Gastroenterology*, Vol. 76, No. 1, Jan. 1979, pp. 166–169.
- [5] Pinsky, M. F., Ducas, J., and Ruggere, M. D., "Narcotic Smuggling: The Double Condom Sign," *Journal of the Canadian Association of Radiologists*, Vol. 29, No. 2, June 1978, pp. 78–81.
- [6] Sinner, W. N., "The Gastrointestinal Tract as a Vehicle for Drug Smuggling," *Gastrointestinal Radiology*, Vol. 6, No. 4, 1981, pp. 319–323.
- [7] Rauber, K. and Müller, D., "Abdomenübersichtsaufnahme zur Identifizierung von Rauschgiftschmugglern," *Deutsche Medizinische Wochenschrift*, Vol. 108, No. 41, Oct. 1983, pp. 1549–1551.
- [8] McCarron, M. M. and Wood, J. D., "The Cocaine 'Body Packer' Syndrome: Diagnosis and Treatment," *Journal of the American Medical Association*, Vol. 250, No. 11, Sept. 1983, pp. 1417–1420.
- [9] Pamilo, M., Suoranta, H., and Suramo, I., "Narcotic Smuggling and Radiography of the Gastrointestinal Tract," *Acta Radiologica: Diagnosis*, Vol. 27, No. 2, March–April 1986, pp. 213–216.
- [10] Caruana, D. S. Weibach, B., Goerg, D., and Gardner, L. B., "Cocaine-Packet Ingestion: Diagnosis, Management, and Natural History," *Annals of Internal Medicine*, Vol. 100, No. 1, Jan. 1984, pp. 73–74.
- [11] Lopez, H. H., Goldman, S. M., Liberman, I. I., and Barnes, D. T., "Cannabis—Accidental Peroral Intoxication: The Hashish Smuggler Roentgenographically Unmasked," *Journal of the American Medical Association*, Vol. 227, No. 9, March 1974, pp. 1041–1042.
- [12] Freed, T. A., Sweet, L. N., and Gauder, P. J., "Balloon Obturation Bowel Obstruction: A Hazard of Drug Smuggling," *American Journal of Roentgenology*, Vol. 127, No. 6, Dec. 1976, pp. 1033–1034.
- [13] Fainsinger, M. H., "Unusual Foreign Bodies in Bowel," *Journal of American Medical Association*, Vol. 237, No. 20, May 1977, pp. 2225–2226.
- [14] Seaman, W. B., "The Case of the Abdominal Smuggler," *Hospital Practice*, Vol. 17, No. 12, Dec. 1982, pp. 74, 79.
- [15] Kersschot, E. A., Beaucourt, L. E., Degryse, H. R., and De Schepper, A. M., "Roentgenographical Detection of Cocaine Smuggling in the Alimentary Tract," *Fortschritte auf dem Gebiete der Rontgenstrahlen und der Nuklearmedizin (ROFO)*, Vol. 142, No. 3, March 1985, pp. 295–298.
- [16] Ghcrardi, R. K., Baud, F. J., Leporc, P., Marc, B., Dupeyron, J.-P., and Diamant-Berger, O., "Detection of Drugs in the Urine of Body-Packers," *The Lancet*, Vol. 1, No. 8594, May 1988, pp. 1076–1078.
- [17] Lancashire, M. J. R., Legg, P. K., Lowe, M., Davidson, S. M., and Ellis, B. W., "Surgical Aspects of International Drug Smuggling," *British Medical Journal*, Vol. 296, No. 6628, April 1988, pp. 1035–1037.

Address request for reprints or additional information to  
 Pekka J. Karhunen, M.D., Ph.D.  
 Department of Forensic Medicine  
 University of Helsinki  
 Kytösuontie 11  
 SF-00300 Helsinki  
 Finland