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The Cocaine Body-Packer Syndrome: Evaluation of a Method of Contrast Study of the Bowel

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ABSTRACT: The questionable reliability of the conventional procedures for detection of ingested drug packages triggered us to evaluate the accuracy of a method of contrast study of the bowel in 23 nonsurgically managed cocaine body-packers. A single dose (60 mL) of a water-soluble contrast compound (amidotrizoate + meglumine) was given orally after initial clinical examination and drug detection in urine. Thereafter, roentgenograms were performed daily after spontaneous passage until obtaining two packet-free stools and negative views. Roentgenograms showed packages when performed at least 3 h after the ingestion of the contrast compound. Sensitivity and specificity of the method with respect to the detection of residual packets in the body, assessed by subsequent examination of stools, was good and did not diminish as the number of packages decreased during the time spent in ward. No side-effects were observed. We conclude that oral administration of a water-soluble contrast compound is an easily performed, efficient, and safe method for the nonsurgical management of cocaine body-packers.

KEYWORDS: criminalistics, cocaine, X-ray analysis, body-packing, contrast study of the bowel, water-soluble compound, drug smuggling

The smuggling of illicit drugs is increasing throughout Western countries [1,2]. Drug determination in urine is a fairly reliable test for detection of body-packers, but positive results are not diagnostic per se [3]. In all cases, confirmation of body-packing by subsequent radiological investigations is required [4-9]. Ordinary plain films of the abdomen are commonly used, but the percentage of false negatives is substantial [5,6,9]. A contrast study of the bowel after oral barium administration has been used in a few cases, but the procedure was judged as being too cumbersome [5,9]. In rare reports, a contrast method using a water-soluble compound has been said to be helpful when radiolucent foreign bodies could not be identified otherwise [8,10]. Furthermore, during the course of elimination of cocaine packages, spontaneous elimination is now considered to be a safe and simple alternative to surgical treatment of the body-packers [6,8].

However, the medical management requires that the physician observe the patient for two main complications of the ingestion of cocaine packages: namely, acute cocaine

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intoxication as a result of leakage from the packages [4,5,8,9] and small bowel obstruction by the cocaine-filled balloons [7,9]. On the other hand, medical management also requires the physician to determine the suitable moment for the patient to leave the hospital, that is, when free of bundles. For this purpose clinical and radiological criteria are generally used together [3,6], but the risk of false negative plain roentgenograms rises as the number of residual packages decreases [3].

We report the results of a contrast study of the bowel performed on 23 cocaine body-packers to evaluate the accuracy of the method for detection of ingested drug packets on admission and during the followup of the smugglers.

Materials and Method

Patients

The patients were apprehended by customs officers in the international airports of Paris for a suspicion of cocaine smuggling in a period of one year between March 1987 and February 1988. The diagnosis was assessed in the Forensic Emergency Service of Paris by physical examination, urine benzoylcegonine (major metabolite of cocaine) detection by an Enzyme-Multiplied Immunoassay Technique (EMIT®-ST) photometer with EMIT reagents (Syva-bioMérieux), as well as supine and upright abdominal radiographs [1,3]. During the course of spontaneous elimination of the cocaine packages the patients were hospitalized in the Department of Toxicology. According to the particular status of the patients, only verbal informed consents were required. No patients had a previous history of iodine allergy. Also females were not pregnant. Patients without symptoms of obstruction were allowed to feed normally and venous access was maintained continuously. The patients received 100 mL of mineral oil two times a day. To avoid possible rupture of packages no more potent laxatives were used [5]. For patients with abdominal pains, nausea, or vomiting, we performed a gastric aspiration, a dextrose infusion, and close monitoring of vital signs.

Opacification

Because of the possibility of a large bowel obstruction needing an emergency surgical treatment, a water-soluble contrast material was used instead of barium sulphate [11,12]. Following abdominal plain films, the body-packers received a single dose of amidotrizoate + meglumine (Gastrografin®). The doses ranged between 50 and 100 mL, that is, 0.8 to 1.2 mL/kg. Subsequently, roentgenograms were performed several hours after the administration of contrast compound and then each morning, but always after a spontaneous passage. During the hospitalization, patients were led to the toilet at least four times a day. Patients were discharged after the passage of at least two packet-free stools and when supine and upright abdominal views did not show any evidence of foreign bodies.

Reading

Plain films and contrast views were read by the senior radiologist, who was not informed about the clinical course of the patients. For each view, three questions were asked to him: (1) are there any packages?, (2) where are they located?, and (3) how many packages are you able to count out? In each case the X-ray reading was compared to the actual timing of the spontaneous passages.

Expression of the Results

By comparing the readings of the roentgenograms to the actual passages of packages, the responses were divided into four groups: positive (a), false positive (b), negative (c), and false negative (d). False positive roentgenograms were considered when no subsequent passage of packages occurred while false negatives when subsequent passage of packages occurred. This classification was determined for:

- (1) the plain abdominal films performed on admission and
- (2) the roentgenograms performed during the contrast study, with results expressed for each day of realization.

This daily classification for each patient allowed the daily estimation of the sensitivity ($a/a + c$) and specificity ($d/b + d$) of this method of contrast study during the time spent in ward. In general, supine and upright roentgenograms were performed together, thus it was defined that a pair whose results agreed, either positively or negatively, was counted as only one result. When one roentgenogram was read as positive and the other as negative, the result was considered as an accurate positive for the pair only if subsequent elimination of packages occurred.

Results

Clinical Status

Twenty-three cases (twenty males and three females), from Colombia, were observed during one year. Size and shape of packages were always the same, that is, Type 2 of Mac Carron [5], with a length of 5 cm and a thickness of 1.5 cm. These bundles contained 4 to 7 g of cocaine, wrapped in cellophane followed by three or four layers of latex, tightly tied with a nonabsorbable surgical ligature at each end. Some packages also included additional layers such as carbon paper or self-adhesive tape. Seventeen patients had ingested diphenoxylate hydrochloride with atropine, a constipative agent, to avoid passages during the trip. Urine tests for cocaine metabolites at initial examination yielded positive results for all of them [3,10].

Table 1 shows the total number of packages passed since their arrest, the number of packages passed during the contrast study, the time between ingestion and gastro-intestinal tract emptying, and the time spent in ward. Only one out of the 23 patients showed evidence of bowel obstruction, but he did not require a surgical interference. All the patients were discharged alive with no evidence of side effects.

TABLE 1—*Clinical status of the patients.*

Data	Mean Values	Range Values
Number of packages ingested	86	39/160
Number of packages passed during the contrast study	59	0/107
Delay (in hours) between ingestion and vacuity	77	24/168
Delay (in hours) between admission and discharge	69	30/152

Plain Films

Twenty-three roentgenograms were performed on admission. There were twenty-two positives and one negative. Figure 1 shows typical opacities outlined by air in the colon.

Contrast Study

The mean ingested dose of water-soluble contrast compound was 60 mL ranging from 50 to 100 mL. Two patients received afterwards another dose of 50 mL of contrast compound and one patient another dose of 100 mL. Opacification of the colon was easy to obtain in spite of the ingestion of a constipating agent by several patients (Fig. 2*a*). The mean duration of opacification with a single dose was 42 h, ranging from 8 to 87 h (Fig. 2*b*). This duration was generally longer than that necessary to obtain a complete vacuity of packages. During this period, patients passed a mean number of 59 packages in the stools. One of the subjects was admitted for body concealment of cocaine but he had previously eliminated all his bundles when he was examined in Forensic Emergency Service and subsequently had no further passage. On the contrary, another subject eliminated 107 packages during the contrast study. The 117 contrast views were performed

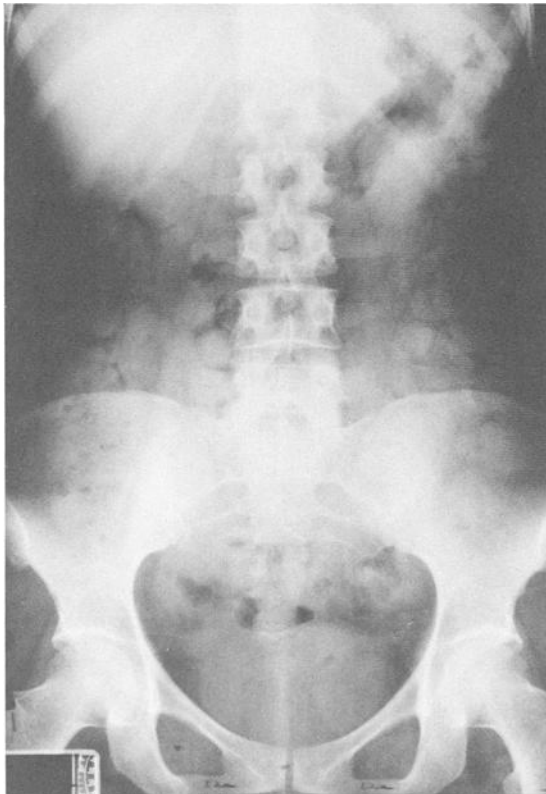


FIG. 1—A plain film performed on admission shows obvious bags outlined by gas mainly in the left colon. The patient eventually eliminated 101 packages during the hospitalization.

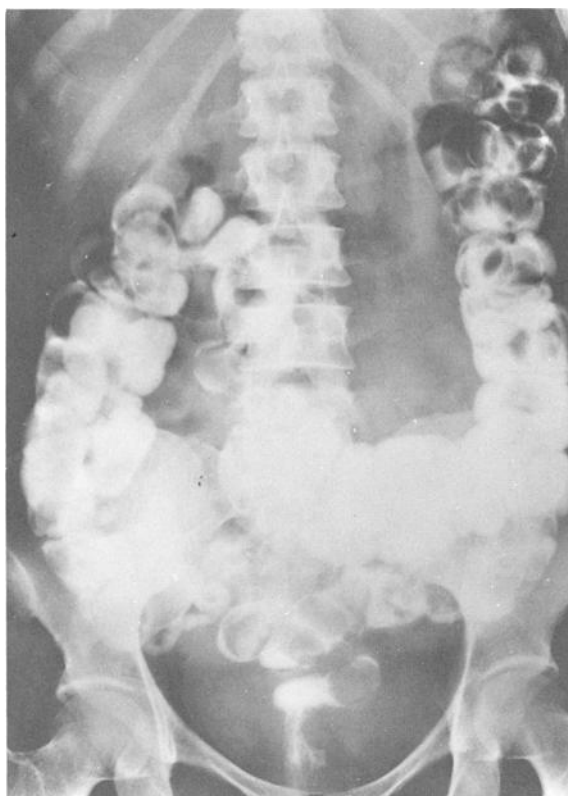


FIG. 2a—Roentgenogram performed 15 h after the administration of 50 mL of water-soluble contrast compound. Eighty-five packages remained to be eliminated.

on the 23 patients. Results are as follows: 66 positives, 41 negatives, 5 false positives, and 5 false negatives.

On nine patients roentgenograms were repeated within the first day. One patient in this series suffered from bowel obstruction and two had a very rapid intestinal course which permitted the elimination of the whole number of packages in less than a day. For the six other patients, views performed less than 3 h after the ingestion of the contrast compound showed widespread diffusion of the contrast compound in the gastrointestinal tract. As no information was obtained either on the number of remaining packages or on their localization, views had to be performed later during the first day of the contrast study.

Table 2 shows the daily classification of the accuracy of reading for the 23 patients. The sensitivity of the method of contrast determined during the first 3 days ranges from 91.7 to 100%. During the same period the daily specificity ranges from 87.5 to 100%. From the fourth day the number of patients was too low for the daily determination of sensitivity and specificity. Accordingly the patients were pooled from the fourth to the seventh day.

Among the ten roentgenograms read, two were true positive (TP), six true negative (TN), one false positive (FP), and one false negative (FN). The latter had only one

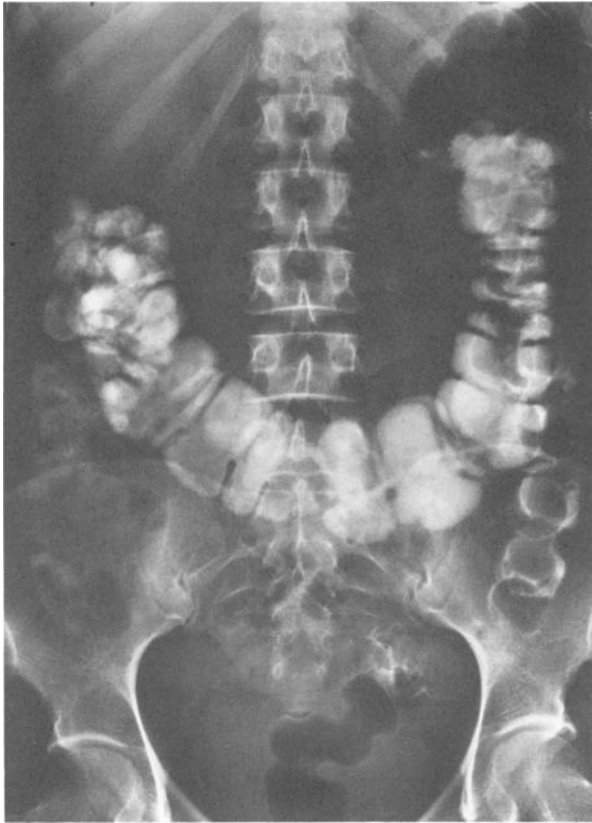


FIG. 2b—Same patient: roentgenogram performed 40 h after the administration of the contrast compound. Twenty-three packages remained to be eliminated.

remaining package. It should be pointed out that, during the first three days, sensitivity and specificity of the method of contrast did not decrease in spite of the diminution of the number of intracorporal packages. This contrast study allowed precise anatomical location of the bundles (Fig. 3). On the contrast roentgenograms performed the first day of the study, packages were in the small bowel (6 times), in the ascending colon (13 times), the transverse colon (11 times), in the descending colon (20 times), and in the rectum (14 times).

Furthermore, the roentgenograms performed on the patient with the bowel obstruction showed that the obstruction was incomplete and allowed the localization of the packages in the digestive tract (Figs. 4a and 4b).

Discussion

At initial examination, drug detection in urine is a simple noninvasive test for suspected body-packing [3]. However accuracy of results decreases during the course of the clearance of packets and the usefulness of this test for assessing the complete clearance of bundles is doubtful [3]. On the other hand, all the authors agree with the possibility of

TABLE 2—Sensitivity and specificity of contrast views. Presence or absence of foreign bodies according to X-ray readings.

	Positive X-Ray Readings	Negative X-Ray Readings	
	FIRST DAY/23 PATIENTS		
Number of patients with packages recovered in stools	22 (tp) ^a	0 (fn) ^b	daily sensitivity (TP/TP + FN) = 100%
Number of patients without package recovered in stools	1 (fp) ^c	0 (tn) ^d	daily specificity (TN/TN + FP)
	SECOND DAY/20 PATIENTS		
Number of patients with packages recovered in stools	11 (tp)	1 (fn)	daily sensitivity (TP/TP + FN) = 91.7%
Number of patients without package recovered in stools	1 (fp)	7 (tn)	daily specificity (TN/TN + FP) = 87.5%
	THIRD DAY/12 PATIENTS		
Number of patients with packages recovered in stools	5 (tp)	0 (fn)	daily sensitivity (TP/TP + FN) = 100%
Number of patients without package recovered in stools	0 (fp)	7 (tn)	daily specificity (TN/TN + FP) = 100%

^atp = true positive.
^bfn = false negative.
^cfp = false positive.
^dtn = true negative.

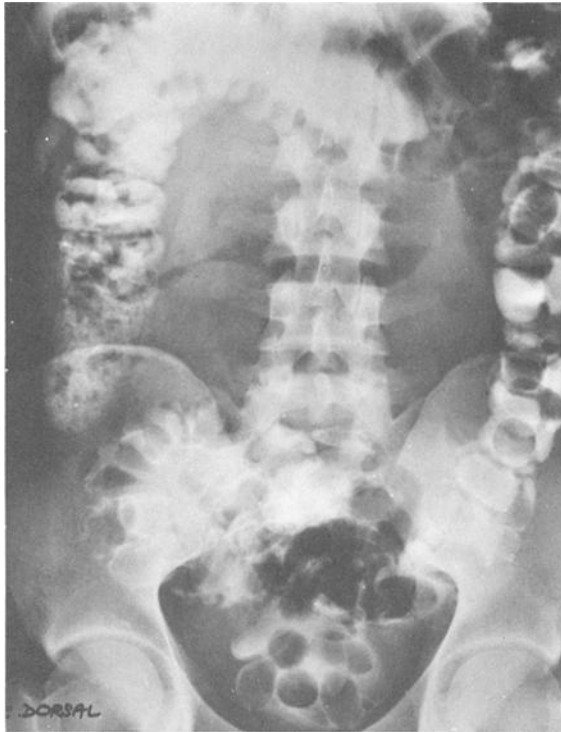


FIG. 3—Supine abdominal roentgenogram performed 22 h after the administration of 50 mL of contrast compound showing numerous clarities outlined by the contrast in the left colon and rectum. Forty-eight packages remained to be eliminated.

false negative plain abdominal radiograms even on admission when the number of packages is the highest [5,10]. Uncertainty about reliability of conventional procedures for diagnosis of body-packing and monitoring of the spontaneous elimination of the cocaine bundles triggered us to evaluate a contrast method of the bowel. Because of the possibility of surgical interference, only a water-soluble contrast compound was used [11,12].

The patient's acceptance of the procedure was good since only one subject refused the contrast agent (Gastrografin) for the first few hours. A 60-mL oral dose of contrast material was sufficient for correct opacification of the whole colon, which contained almost all the packages by the time of admission. The colon rapidly was completely opacified (mean delay: 5 h) which is surprising in light of the common use of a constipating agent (Lomotil®) by these smugglers.

With a single dose of contrast material, sustained opacification of the colon allowing visualization of the packages was observed in all patients except three during the whole course of elimination.

From the individual analysis of supine and upright roentgenograms that were performed daily, and compared with the presence or absence of residual packets in the body assessed retrospectively by the examination of stools, we conclude that a combination of supine and upright views are sufficient for the visualization of the packages with a high specificity and sensibility even late after admission. Furthermore, as the number of packages shown

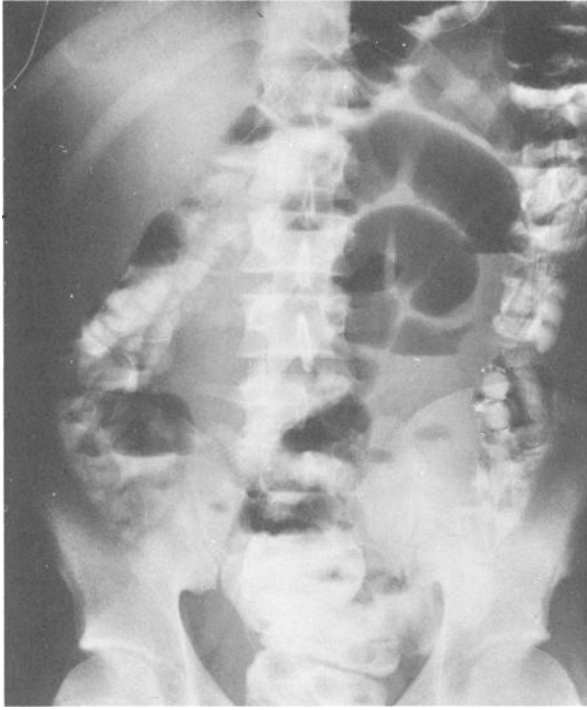


FIG. 4a—Upright roentgenogram, performed 36 h after administration of 100 mL of water-soluble contrast compound, showing small bowel obstruction and foreign bodies.

by the supine view is higher than that of the upright one, the former view is able to give more information than the second one for the search of residual packets. An additional usefulness of upright abdominal roentgenograms occurred in a patient in our series who presented with small bowel obstruction. The upright abdominal roentgenogram demonstrated that the obstruction was not complete which avoided surgical intervention. No other complication was observed in this series.

Gastrografin is an osmotically active agent which triggers the intestinal transit and permits an easy passage of packages. Therefore, the proposed method also has a therapeutic value and it is noteworthy that it has not increased the duration of hospitalization.

Conclusion

In conclusion we propose the following protocol for the medical management of the cocaine body-packers. After the initial drug detection in urine and abdominal plain films, the individual receives an oral dose of 60 mL, that is, 0.9 mL/kg of water-soluble compound.

The first view is performed 5 h later or more after ingestion of the contrast material. Then, a daily view is performed. The patient may be discharged with negative views after the passage of two packet-free stools.



FIG. 4b—Supine roentgenogram performed at the same time as Fig. 4a on the same subject. The colon opacification revealed an incomplete obstruction.

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