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# Digestive endoscopic removal of cocaine pellets: Safety evaluation

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## ABSTRACT

**Background and study aims** Removal of cocaine pellets by endoscopy is the subject of much debate, due to the supposed risk of rupture. This study aimed to evaluate the safety of digestive endoscopic removal of cocaine pellets.

**Patients and methods** This was a single-center, observational, retrospective study conducted at the Cayenne Hospital in French Guiana from July 2015 to May 2023. We included patients in whom digestive endoscopy was performed for delayed evacuation despite conservative treatment defined by persistence of pellets on imaging from the third day of hospitalization. Endoscopy was performed only if the pellets present were at low risk of rupture (type 4 according to the classification by Pidoto in 2002). We collected demographic, imaging, endoscopic and follow-up data.

**Results** We included 111 patients, 75% of whom were male. Median age was 25 years (range, 20–33). Imaging was performed in 99% of cases. On imaging prior to endoscopy, pellets were found mainly in the stomach (28%), right colon (28%), left colon (30%), and sigmoid (31%). Median time to endoscopy was 3 days (range, 2.5–4). Median number of pellets extracted endoscopically was one (range, 1–4). The material used was mainly endoscopic baskets (60%). No patient presented any per or post-endoscopic

complications. No pellets ruptured during extraction. There was no sign of cocaine intoxication during or after endoscopy. The success rate for pellet removal was 92% during the first endoscopy and 100% during the second endoscopy.

**Conclusions** Endoscopic removal of micro-industrially-produced cocaine pellets seems to be a safe and effective method. Therefore, endoscopy has a place in management of these patients.

## Introduction

In recent decades, there has been a significant increase in intracorporeal drug transport [1,2,3]. Three methods of intracorporeal transport have been described: body packing, body stuffing, and body pushing [2,4].

The most widely used classification of drug packaging, which was established in 1983 by McCarroon and Wood, divides packaging into three categories [5]. Type 1 corresponds to less resistant packaging (condoms, balloons) with a high risk of rupture. Type 2 corresponds to very compact powder, wrapped in multiple layers of latex, with a low risk of rupture. Type 3 corresponds to hard paste, wrapped in non-radiopaque packaging. In 2002, Pidoto et al. described Type 4, exclusively for cocaine transport, where the pellets are micro-industrially prepared [6]. Type 4 is currently found mainly in French Guiana, with reinforced packaging and a very low risk of breakage.

Body packing was first described in 1973 [7]. In the following years, surgery was recommended as the first-line treatment. Today, the European Society of Gastrointestinal Endoscopy (ESGE) and the American Society for Gastrointestinal Endoscopy (ASGE), recommend close clinical monitoring of asymptomatic body drug carriers, and surgery only in cases of suspected pellet rupture (acute signs of intoxication), failed progression or signs of digestive obstruction [8]. Indeed, several patient cohorts have demonstrated the safety of conservative management [2,9,10,11]. Endoscopic removal of pellets is not recommended [8]. Fear of rupture of drug pellets is supported only by small or old series [12]. To our knowledge, no published study has assessed the safety of endoscopic removal of Type 4 pellets.

Because of its geographical location (between Surinam and Brazil) and its European status, French Guiana is a major transit point to Europe for cocaine. A report estimates that 15% of the cocaine consumed in France is transported by body packers from French Guiana [13]. The number of arrests at the international airport is increasing, from 150 between 2015 and 2019 to more than 400 per year in 2022 and 2023. The Cayenne Hospital has established a dedicated pathway for managing body packers through the Emergency Department [14]. Endoscopic treatment of pellets is part of this management.

The primary objective of our study was to evaluate the safety of endoscopic pellet removal by describing cases managed at the Cayenne Hospital Center. The secondary objective was to evaluate efficacy of endoscopic pellet removal.

## Patients and methods

### Study design and population

This was a single-center study conducted in the Gastroenterology Department in the Cayenne Hospital. The study was observational, retrospective, and based on data collected from computerized records of patients followed from July 2015 to May 2023.

### Inclusion and exclusion criteria

Inclusion criteria were all patients with cocaine pellet extraction. Exclusion criteria were presence of another drug or absence of pellets found at endoscopy.

Given our primary objective, which was to assess the safety of cocaine pellet removal, we excluded all patients for whom no pellet was found at endoscopy. We excluded all patients carrying drugs other than cocaine to have a homogeneous group.

### Cocaine pellet classification

We used the McCarron and Pidoto classification [5,6,15]. MacCarron described three types. Type 1 are highly susceptible to leakage or rupture and contain loosely packed drug covered with two to four layers of wrapping, usually made of a condom tied at one end, folded back over itself, and tied again at the opposite end. Type 2 are characterized by a larger size and consist of a bundle of tightly packed drug covered with five to seven layers of tubular latex or latex gloves and tied tightly with a knot at each end. Type 3 are similar to Type 2 packages, but they are wrapped in aluminum foil and over wrapped with three to five layers of tubular latex securely tied at both ends.

Pidoto described a fourth type. Type 4 are industrial packages used for cocaine only, prepared by dissolving cocaine hydrochloride in an alcohol-water solution and placing the resulting dense paste in a specific device and, when hardened, packed in tubular latex. Preparation is completed by covering the package with colored paraffin or fiberglass.

### Body packer management

Body packers were managed according to the established protocol: Plain radiography to confirm presence of pellets and initial medical examination (check of vitals, questioning about the type and number of pellets and date of ingestion/insertion, physical examination, electrocardiogram, blood test, urine test). The medical examination specifically aims to detect any complications (signs of cocaine impregnation, occlusive syndrome). Asymptomatic patients with confirmed pellets on imaging were transferred to the secure unit and held in hospital custody for 96 hours (legal duration of police custody) until

the pellets had been completely evacuated. During their stay in the secure unit, patients were monitored by a paramedical team, under the supervision of a doctor. They were fasting and a conservative medical treatment with PEG at a rate of 4 L per day was started.

Pregnant women did not undergo imaging (with rare exceptions), but were managed otherwise in the same way as the other patients.

### Endoscopy management

In our clinical experience, and as reported by previous studies in our center, almost 90% of people have a complete evacuation of pellet after 2 days. In view of this and of the current quality of the packaging (micro-industrial pellet with very low risk of rupture), after discussion with the different actors involved in management of body packers, the decision was made to perform endoscopy to extract the pellets in the event of prolonged stagnation if the patient consented. Day 0 was the date of admission. Delayed evacuation was defined as persistence of pellet in the stomach and/or colon on Day 3. Endoscopic extraction was discussed and performed after inspecting the pellets already evacuated and checking their solidity, in the absence of hemodynamic repercussions or surgical abdomen. In our center, endoscopy was performed under general anesthesia or with sedation with midazolam 5 mg and morphine hydrochloride 5 mg, or under local anesthesia with lidocaine (for upper gastrointestinal endoscopy [UGE]) or without sedation. UGE was mainly performed under general anesthesia but a few patients were sedated for both colonoscopy and UGE; colonoscopy alone was performed without sedation. If extraction failed, the examination was then performed under general anesthesia if the first examination was not. In the event of failure due to an excessive number of colonic pellets, PEG treatment was again administered.

Pregnant women are also involved in cocaine trafficking, which complicates treatment because of the risk of fetal irradiation. They conceal the pellets extra corpore and in corpore, usually by vaginal or rectal insertion. In the absence of imaging, it is not possible to know whether they have pellets in their digestive tract, or to assess the quantity of pellets. The decision was made to propose endoscopy systematically (UGE and colonoscopy) after 24 to 48 hours of PEG and two stools without pellets, and with patient consent.

Safety of endoscopic removal was defined as absence of pellet breakage during the examination, integrity of packaging observed after pellet removal, absence of clinical signs of post-endoscopy cocaine impregnation, and absence of need for resuscitation following endoscopy.

Efficacy was defined by achievement of digestive vacuity after endoscopy, attested to by low-dose CT imaging. In the case of CT scan performed prior to endoscopy with accurate pellet counts, there was no post-extraction control if pellet counts were concordant.

### Data collection

For each patient, the following demographic data were collected: age, sex, current pregnancy, imaging, endoscopy, and follow-up data. Data collection (anonymous) was carried out by a single investigator based on review of the computerized patient record. Data were collected in a standardized Excel spreadsheet.

### Statistical analysis

Patient characteristics were presented as medians (interquartile range [IQR] for continuous variables, and as numbers (percentages) for categorical data. All statistical analyses were performed using Stata 13.0 (StataCorp, College Station, Texas, United States).

### Ethical and regulatory approval

The typology of this study corresponds to Research Not Involving the Human Person (RnIPH). All data were collected from the medical records of patients in the Gastroenterology Department. These data were pseudonymized and processed by medical staff in the Gastroenterology Department (principal investigator or any person under his responsibility). The study, therefore, was an internal research study, in accordance with the Commission nationale de l'informatique et des libertés. In addition, participants were collectively informed by posters in the Emergency Department. Any opposition by patients to taking part in the study was taken into account. The study was registered in the hospital data processing register with the Cayenne Hospital Data Protection Officer.

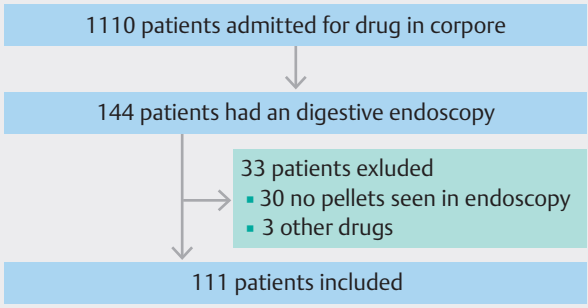
## Results

Over the study period, 1110 patients were admitted for suspicion of in corpore drug transport. A total of 144 patients underwent digestive endoscopy for pellet extraction. Cocaine pellets were found in 111 patients, who were included in the analyses. Thirty-three patients were excluded: three carrying cannabis and 30 with endoscopic examinations that revealed no pellets. Of these 30 patients, 20 were pregnant women in whom no imaging was performed prior to endoscopy. Ten patients had endoscopy with no pellets found and had at least one imaging study prior to endoscopy. Among them, there were two false-positives on the CT scan, three patients with errors in counting the number of pellets by the police, two patients with gastric pellets that had progressed into the small intestine at the time of UGE, and three patients who had hidden expelled pellets, resulting in a counting error. A total of 111 patients were included in the analysis (▶ **Fig. 1**).

Eighty-three patients were men (75%) and 28 women (25%), with a median age of 25 years (range, 20–33) (▶ **Table 1**).

Six patients (21% of the females, 5% of the total population) were pregnant.

Of the 111 patients, 110 had at least one imaging study. One pregnant woman did not have initial imaging, whereas five others did (pregnancy was not known before). At least one pellet was found on imaging prior to endoscopy in all patients. Type




▶ **Fig. 1** Study flow chart.

▶ **Table 1** Population characteristics.

| Characteristics | Population (n = 111) |
|---|---|
| Age | 25 (range, 20–33) |
| Sex | |
| Male | 83 (75) |
| Female | 28 (25) |
| Pregnancy | 6 (5) |
| Imagery before endoscopy | |
| Abdominal plain radiography | 104 (96) |
| CT scan | 53 (48) |
| Abdominal plain radiography and CT scan | 49 (44) |
| Abdominal ultrasonography | 2 (2) |
| Number of pellets on imaging before endoscopy | 1 [1, 2, 3] |
| Location of pellets on imaging before endoscopy | |
| Stomach | 30 (28) |
| Duodenum | 2 (2) |
| Ileum | 3 (3) |
| Cecum | 11 (10) |
| Right colon | 31 (28) |
| Transverse colon | 16 (15) |
| Left colon | 31 (30) |
| Sigmoid | 34 (31) |
| Rectum | 16 (15) |
| Imaging delay-endoscopy (hours) | 6 (range, 3–15) |
| Delay before endoscopy (days) | 3 (range, 2.5–4) |
| Endoscopy | |
| Upper gastrointestinal endoscopy | 40 (36) |
| Colonoscopy | 89 (80) |
| Upper gastrointestinal endoscopy and colonoscopy | 18 (16) |
| Endoscopy modality | |
| General anesthesia | 32 (29) |
| Sedation | 32 (29) |
| Without sedation | 47 (42) |
| Number of pellets founded on endoscopy | 1 (range, 1–4) |
| Location of pellets on endoscopy | |
| Stomach | 28 (25) |
| Cecum | 26 (24) |
| Right colon | 12 (11) |
| Transverse colon | 14 (13) |
| Left colon | 23 (21) |
| Sigmoid | 39 (35) |
| Rectum | 22 (20) |
| Extraction material | |
| Basket | 66 (60) |
| Polypectomy loop | 42 (38) |
| Manual | 6 (5) |

Data are expressed as median (interquartile range) or proportion (%).
CT, computed tomography.

of imaging, time between imaging and endoscopy, number of pellets and their location are shown in ▶ **Table 1**. Delay time between imaging and endoscopy was 6 hours (range, 3–15). Time depended on availability of endoscopy and/or operating rooms and the police team. Pellets were located mainly in the sigmoid (31%), left colon (30%), right colon (28%) and stomach (28%).

Thirty-three patients (30%) had gastroduodenal pellets on imaging. All benefited from UGE+/-colonoscopy. Pellets were found in the stomach/duodenum in 29 patients (88%), in the colon in three patients (10%), and not found at gastroscopy and colonoscopy in one patient in whom the pellet had progressed into the small intestine at time of endoscopy.

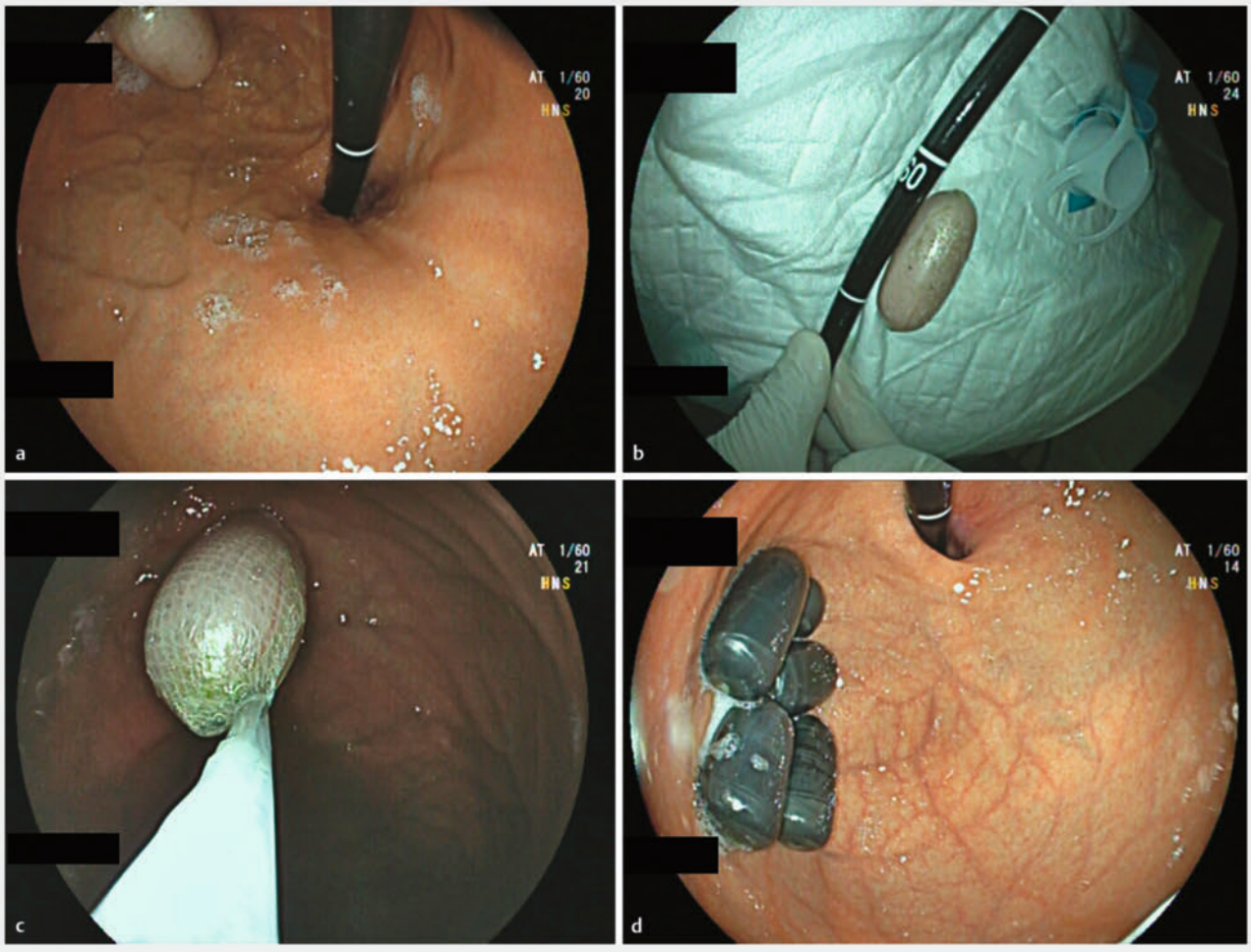
Eighty-one patients had at least one colorectal pellet on pre-endoscopy imaging. One did not have a colonoscopy because the (rectal) pellet was expelled before the endoscopy. All the rest had a colonoscopy (99%) and the pellets were found in all of them.

None of the patients had pellets in the small intestine (except for the duodenum) on pre-endoscopy imaging.

No patient without a pellet on pre-endoscopy imaging underwent endoscopy.

Median time between hospitalization and endoscopy was 3 days (range, 2.5–4).

Of the 111 patients, 82 underwent endoscopy for delayed evacuation according to our definition (74%). Twenty-nine underwent early endoscopy, including two for pregnancy, seven




▶ **Fig. 2** Gastric pellets, endoscopy after 48 hours.

for gastric stagnation > 24 hours, six for cecal stagnation > 24 hours, and 14 for one to three colonic pellets with difficulty in taking PEG and tolerating fasting.

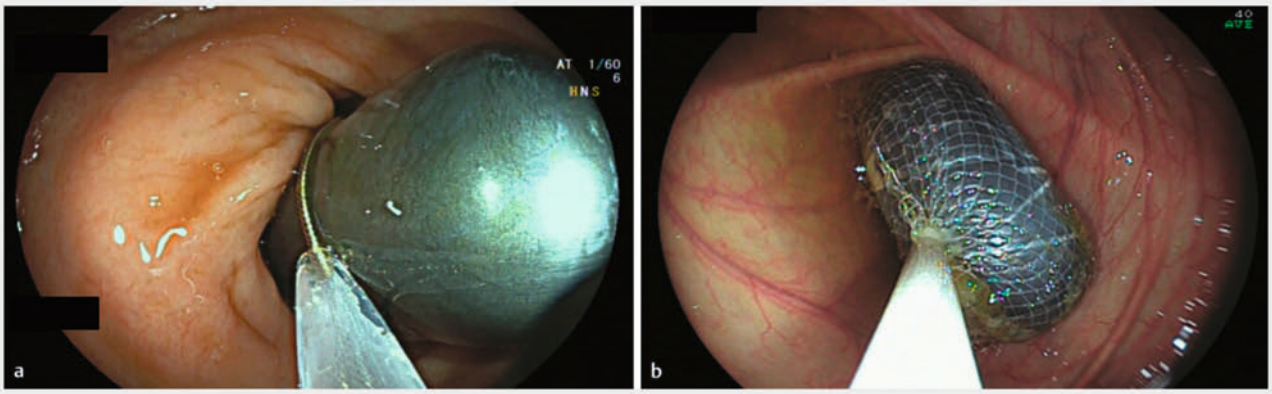
Forty patients underwent UGE and 89 underwent colonoscopy, 18 of whom had both examinations. UGE was performed under general anesthesia in 23 patients (58%), including 12 (52%) with spontaneous ventilation and 11 (48%) with intubation; under sedation in 13 patients (32%) and under local anesthesia with lidocaine in four patients (10%). Another eighty-nine patients underwent colonoscopy: 18 (20%) under general anesthesia, 27 (30%) under sedation, and 44 (50%) without sedation. During endoscopy, pellets were located mainly in the sigmoid (35%), cecum (26%), and stomach (25%). Median number of pellets removed was one (range, 1–4) (▶ **Fig. 2** and ▶ **Fig. 3**).

Equipment used was mainly an endoscopic basket and a polypectomy loop, with Type 4 pellets in 100% of cases.

Fifty-nine patients (54%) underwent post-endoscopy imaging. Of the 51 patients who did not undergo post-endoscopy imaging, four were pregnant women and 39 patients had undergone CT imaging prior to endoscopy, enabling an accurate count of the number of pellets remaining to be evacuated endoscopically.

No patient presented any per or post-endoscopic complications. No pellets ruptured or cracked. One patient was hospitalized in the Intensive Care Unit (ICU) prior to endoscopy for symptoms (palpitations, sweating, tachycardia, psychomotor agitation) suggestive of acute cocaine intoxication due to pellet rupture, with a positive urine test. Endoscopy was performed after medical and surgical discussion. The extracted pellets were found to be intact. No other patient was admitted to the ICU after endoscopy. No patient showed post-endoscopy acute cocaine intoxication.

In terms of efficacy, endoscopy was successful in 101 patients (92%). There were nine reports of failed extractions, due to poor tolerance of colonoscopy, large number of pellets (10 to 16 pellets) in seven patients, or difficulty in passing through the esophageal orifice in the two patients who underwent endoscopy without general anesthesia. All patients who underwent a second endoscopy had successful pellet extraction.




▶ **Fig. 3** Colon pellets.

## Discussion

Our study included 111 patients and presents the largest cohort to date. No per or post-endoscopic complications were observed. Efficacity of pellet extraction was high (92% after the first endoscopy and 100% after the second endoscopy). These results agree with previous studies carried out at the Cayenne Hospital [16]. All the pellets were Type 4 according to the classification of McCarron and Pidoto [5, 6].

The population studied was similar to that found in the literature. The ages were equivalent (median age 25 years) [17], as was the sex distribution (sex ratio M/F 4/1) [3, 10].

Recommendations for expulsion of cocaine pellets are based on conservative management. Several studies recommend use of a laxative and close monitoring [2, 9, 10, 11, 18]. This management is effective and the complication rate is low (<5%). Non-hospital management was suggested in one study [18]. However, complete expulsion can take a long time, from 3 to 5 days [19, 20, 21].

Endoscopy is not recommended in patient management, mostly because of fear of rupture during extraction. Some fatal outcomes have been reported [12]. However, in those cases, the drug was contained in crude packaging (condom). Today, the drug is mostly transported in micro-industrial packaging, with a low risk of breakage [2]. Recent studies have demonstrated the outcome of endoscopy for drug-type foreign bodies. A prospective study compared the outcome of patients undergoing endoscopic extraction of drug baggies (less resistant than Type 4 pellets) versus those receiving medical treatment [22]. Length of hospital stay and complication rate were lower in the endoscopic group. The drug baggies were exclusively intragastric, and mainly heroin and methamphetamine. Another study in 2022 reported successful endoscopic extraction of an intragastric heroin baggie [23]. In a letter to the editor, a team mentioned endoscopy for heroin baggie extraction, but also raised the question of endoscopy for cocaine pellets with a trained team and after medico-surgical discussion [24]. Endoscopy has been purposed as an alternative to surgery in case of gastric stagnation for a single pellet in an asymptomatic patient [1].

Mean time to endoscopy in Cayenne Hospital is 3 days. This is the cut-off point chosen to define stagnation and may lead to endoscopy. This choice was made for several reasons. In our clinical experience, and as reported by previous studies in our center [14, 16], almost 90% of people have complete pellet evacuation after 2 days. Transporting drugs (cocaine) in the digestive tract is not harmless. In a study of 581 body packers in France, the average hospital stay was 5 days [19]. Some patients had a longer stay (up to 18 days) without pellet rupture. The question that may arise is how long cocaine can safely be left in the digestive tract without risk of rupture. There are no robust data in the literature on this subject. In some studies, surgical management was proposed after 5 days of pellet stagnation [25, 26]. The team of gastroenterologists at Cayenne Hospital is trained for this type of procedure. Type 4 pellets, with a low risk of rupture, are the most common in French Guiana. In some countries, asymptomatic body packers are treated on an outpatient basis in detention facilities under medical supervision [3, 18]. In France, body packers are monitored in hospital [14, 16, 19]. French Guiana is suffering from the scourge of cocaine trafficking and the number of body packers continues to rise, leading to saturation of the judicial, prison, medical, police, and customs systems [13]. Duration of police custody in France is 96 hours, and in French Guiana, not all body packers are incarcerated at the end of this period, which can complicate matters for those who have not finished expelling and who will not be incarcerated: Return home with intracorporeal drugs or hospitalization in a conventional ward among patients who are not involved in drug trafficking.

For all these reasons, we have set a threshold of 3 days for the proposal and performance of an endoscopy. However, 26% of patients underwent early endoscopy on Day 1 or Day 2 because of pregnancy, gastric or cecal stagnation for more than 24 hours, or difficulty tolerating fasting or refusal to drinkPEG (if only a small number of pellets [< 3] remained).

Management of pregnant women with body packing is delicate [27]. Because they should not undergo imaging, the evolu-

tion of pellet expulsion is unknown. In our center, in such cases, an upper and lower digestive endoscopy is performed to check vacuity after two stools without pellets, if the patient agrees. This practice is questionable, especially because it leads to normal endoscopies without pellets. Consideration is currently being given to improving management in pregnant women.

Endoscopic management in body packers needs further investigation. The type of management may depend on the location of the pellets. In some centers, as at the Hôtel-Dieu in Paris, a low-dose CT scan is systematically performed. Patients in whom pellets are in the gastrointestinal tract are fasted and monitored in continuous care, otherwise a light diet is authorized [28]. In Cayenne Hospital, patients undergo plain radiography on admission. This imaging can confirm presence of pellets but does not give a precise description of their location. In fact, errors in location in the gastrointestinal tract, in particular, may occur. So, in the Cayenne Hospital, all patients with cocaine pellets are fasted.

The ESGE recommends against endoscopic retrieval of drug packets. They recommend close observation in asymptomatic individuals who have concealed packets of drugs by swallowing (body packing) and surgical referral in cases of suspected packet rupture, failure of packets to progress, or intestinal obstruction. But endoscopy appears to be an alternative to surgery in asymptomatic patients [1] and to reduce the duration of strict fasting and the length of observation in the ICU. In our study, endoscopy was conducted for gastric stagnation in 25% of cases.

Methods used to perform endoscopy must be discussed. In the presence of a gastric pellet, endoscopy is generally performed under general anesthesia, but it can also be performed under sedation with midazolam and morphine, depending on local protocol. There have been reports of failed passage through the esophageal orifice when UGE was done under sedation, which suggests that all examinations should be performed under general anesthesia. Moreover, a large number of colonic pellets was associated with extraction failure. This raises the question of defining the maximum number of pellets and systematically performing colonoscopy under general anesthesia for those with a high number of pellets.

The equipment used for removal was usually a basket. However, the size of the pellets did not always allow this equipment to be used. For larger pellets, we used large polypectomy loops.

In our experience, the cocaine transported is generally in powder form, but a new form, liquid cocaine, is found in condoms [29]. We encountered one such case during a period outside the study, for which endoscopic withdrawal was successful. However, even greater vigilance is required in such situations.

Finally, the limitation of this study is its retrospective nature, leading to recall bias, although this was partly remedied by the quality of the endoscopy reports (many details on indication and context).

## Conclusions

Endoscopic removal of Type 4 cocaine pellets was a safe method, with no complications in our study. The success rate for a first digestive endoscopy was 92%, but this rate could be further improved by performing endoscopy under general anesthesia (100% success rate at second endoscopy). To our knowledge, with 111 studied patients, this is the largest real-life study of endoscopic removal of cocaine pellets in body packers. These results will need to be confirmed by a larger prospective study based on a well-protocolized pellet-type follow-up medical record. Digestive endoscopy could be an alternative to surgery in certain cases of body packing. Since this study, we have improved the protocol for endoscopic management of pellets. It would also be interesting to carry out a cost-effectiveness analysis of endoscopic management versus conservative medical treatment in countries where body packers are monitored exclusively in hospital. It would also be interesting to assess whether allowing food intake results in less recourse to endoscopy, which would be explained by better intestinal motility.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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