Volume 114
Number 2

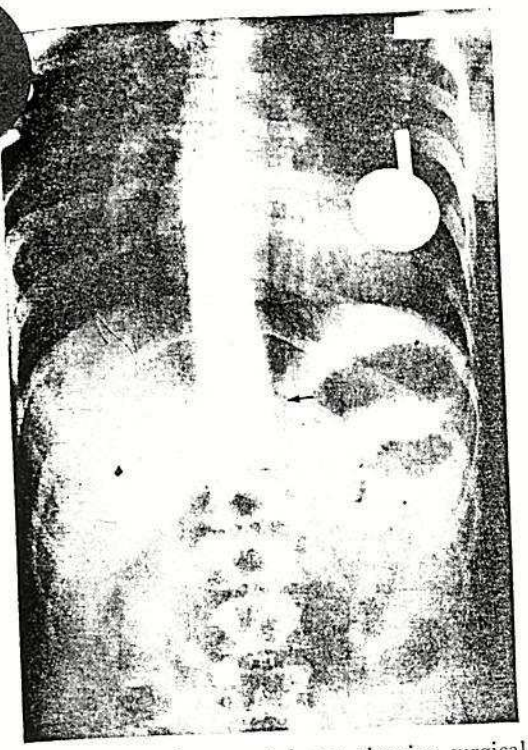

Fig. 3. X-ray of upper abdomen showing surgical clip (arrow).

not be seen. The uterine cavity was probed, but the Antigon was not felt.

An x-ray of the abdomen was taken. This showed a metal bar, consistent with the radiographic appearance of an Antigon, high in the pelvis on the right side. It was thought at this time that the device had perforated the uterine wall and was lying free in the pelvis. One week later, a hysterogram was performed. This showed a normal uterine cavity with the metal bar in the region of the right parametrium (Fig. 2).

The patient was admitted to the hospital for removal of the "ectopic" device and bilateral tubal ligation. On Oct. 12, 1971, a laparotomy was performed. Diligent search of the pelvis and upper abdomen revealed no Antigon. The right broad ligament contained a silver surgical clip embedded between the anterior and posterior leaves. A flat plate of the upper abdomen was obtained and this revealed another metallic clip under the diaphragm (Fig. 3). A bilateral tubal ligation was then performed, and the patient was discharged 6 days after operation. It is of interest that this patient had undergone a partial gastrectomy and bilateral vagotomy at another hospital, in 1964.

Uterine perforation, although it occurs infrequently, remains a major complication of IUD use.[2] Most nonmetallic devices contain a radiopaque material that conforms to their shape, so that x-ray identification of an ectopic device is relatively simple. A few, like the Antigon, contain a short metal strip or bar that in no way mimics their contour. This case demonstrates the possibility of confusing the radiologic appearance of this type of identifying bar with a commonly used surgical clip.

Patients in whom perforation with an intrauterine device containing only a bar marker is suspected must be carefully evaluated with regard to previous operations. The use of clips or wire must be kept in mind. X-rays of the entire abdomen, not just the pelvis, are mandatory. This will occasionally reveal, as in our case, the presence of multiple metal surgical artifacts and may help to differentiate them from an ectopic intrauterine device.

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The Karman catheter: A preliminary evaluation as an instrument for termination of pregnancies up to twelve weeks of gestation

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In 1970, Harry Karman described a flexible polyethylene catheter for vacuum aspiration of first-trimester pregnancies, 6 mm. in diameter with two triangular openings just below a rounded tip. The advantages of this cannula were said to be that of easy and painless introduction into the pregnant uterus without prior dilatation or anesthesia, prevention of uterine perforation due to its flexibility, effectiveness by application of the usual negative pressure of 0.8 atmosphere (600 mm. Hg), and disposability. To the best of

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Table I. Distribution of study patients

	Weeks of pregnancy							Total	
	6	7	8	9	10	11	12		
Primigravida	23	6	11	0	2	0	2	44	322
Multigravida	203	24	37	0	7	0	7	278	

Table II

Abortion	Residue	Weeks of pregnancy							Total	
		6	7	8	9	10	11	12		
Without gynesthesin	No	82	2	4	0	0	0	0	88	
	Yes	13	3	15	0	5	0	2	38	126
									(30.1%)	
With gynesthesin	No	116	14	3	0	0	0	0	133	
	Yes	15	11	26	0	4	0	7	63	196
									(32.1%)	
Total	No	198	16	7	0	0	0	0	221	
	Yes	28	14	41	0	9	0	9	101	322
	% residue	12%	47%	85%	100%	100%	100%	100%	(31.2%)	

our knowledge, no results have been published concerning this cannula in clinical trials, though it is used in the United States, England, Yugoslavia, and Thailand.

In 1971, the Karman catheter was used in some legal abortions up to 12 weeks' gestation in the Department of Gynecology and Obstetrics in Novi Sad. This clinic has performed 25,000 first-trimester vacuum aspirations over the past 10 years.[1] This brief report will present some clinical observations in using this catheter.

The Karman catheter was used in 322 patients. It was attached to a VA-3 (I.E.T.-Yugoslavia-Ljubljana) vacuum apparatus. The patient received Gynesthesin* as a paracervical block in some cases. Patients from the sixth to the twelfth weeks of pregnancy were selected for the study. Both primigravid and multigravid patients were included. After every aspiration, an ordinary curette was used to see if products of conception were retained in the uterus.

Table I shows the distribution of patients according to weeks of gestation and according to multiparity or nulliparity. The vast majority of patients studied (203 of 322) were multigravid patients at the sixth week of gestation. Dilatation was required in 15 patients (4.6 per cent), 8 of whom had paracervical blocks. Toward the end of the study, it was found that introducing a uterine sound into the cannula itself strengthened the cannula and allowed introduction of the cannula into a resistant uterus. Thus, toward the end of the study, very few patients required a separate dilatation after we discovered the "trick" of strengthening the flexible cannula with a sound.

In 3 multigravid patients (0.9 per cent), it was not possible to obtain sufficient negative pressure through the catheter because of the width of the cervical canal. In these cases, the remaining tissue had to be removed by a curette after attempts at aspiration.

The time needed for evacuation of the uterus with the Karman catheter was, on an average, 60 to 70 seconds longer than normally required with other types of cannulas.

Table II shows the number in whom Gynesthesin had to be resorted to and rates of retention of products of conception. In the sixth week of gestation, about 12.4 per cent of the patients were found to have retained products of conception; at the seventh week of gestation, the figure was just under 50 per cent; at the eighth week, about 80 per cent of patients had retained products; all of the 18 subsequent patients with pregnancies up to 12 weeks' gestation exhibited retained products. Analysis of other factors influencing retention revealed that neither paracervi-

*Galenika, Beograd, Yugoslavia.

cal block nor parity appeared to be as strong an influence as the duration of gestation.

Postoperatively, 2 (0.6 per cent) patients developed hematometra after evacuation; in one case, the problem was acute with dramatic symptomatology; in the other the complication was asymptomatic and detected only 2 weeks after operation. There was no residue noted by curette in either case. In both cases, instrumental dilatation of the cervical canal allowed the accumulated blood to drain away without further serious complications.

In this study, there were no important inflammatory complications, no injuries to the genital organs, no significant loss of blood during the procedure, and no deaths.

In 1965, Papasov, Atanasov, and Mihneva[2] published their efforts to terminate pregnancy with a metal cannula with an outside diameter of 3.75 to 7.5 mm. They performed abortions on 158 women between the fifth and ninth weeks of pregnancy, but there were no details in this publication as to residue or other postabortal complications.

Since this report, essentially two instruments have evolved in Yugoslav clinics, the specifications of which are presented in Table III, together with those of the Karman catheter. Both of the standard Yugoslav catheters are made of metal and have an outer diameter of 8 to 10 mm, requiring dilatation. The advantage of ease of insertion of the Karman catheter with a small diameter may be offset by the resultant smaller cross-sectional surface area of evacuatory openings (28.3 mm.^{2} for the Karman catheter; 50.2 and 78.5 mm.^{2}, respectively, for the standard Yugoslav metal cannulas). This smaller area of negative pressure may account for the higher incidence of residue. In this study, an over-all residue of 31.2 per cent was found. This compares unfavorably with an experience of 1.3 per cent of residue in this clinic when the other two cannulas are used routinely and 3.8 per cent when abortion is performed with the classical dilatation and mechanical curettage technique.

The flexibility of the cannula is an advantage in minimizing the potential of injury to the uterus; it was found to be a distinct disadvantage in attempting insertion of the catheter into some retroflexed uteri. The "trick" of inserting a uterine sound overcame both the flexibility and the safety features of the catheter. This increased flexibility also made it more difficult to manipulate, especially in removing an "eccentrically" placed ovum or when this ovum was in a retroflexed uterus. In these situations there was almost always a residue of tissue. Finally, it can clearly be seen from Table II that in pregnancies beyond 8 weeks' gestation the catheter does not evacuate the uterus; in most of the cases, the greater part or all of the fetus had remained in the cavity.

Table III. Comparison of Karman with standard vacuum cannulas

Features of the cannula	*Karman*	*I.E.T.*	*Beric B*
Made of	Plastic	Metal	Metal
Length of the real diameter (mm.)	6	8-10	8-11
No. of aspiratory openings	2 Lateral	1 Lateral	1 At tip
Shape of aspiratory openings	Triangular	Elliptical	Circular
Surface area of aspiratory openings (mm.^{2})	35	17.6-34.0	28.3-57.5
Surface area of evacuatory opening (mm.^{2})	28.3	50.2	78.5

In a clinic which has performed over 25,000 legal abortions, mostly by aspiration on an outpatient basis, a clinical trial of the Karman catheter was performed on 322 patients. Retained products of conception were found in 12 per cent of all pregnancies of 6 weeks' gestation, and in 100 per cent of pregnancies beyond 8 weeks. Although the catheter was usually easy to insert painlessly, it occasionally required reinforcement with the uterine sound, negating the advantages of the flexible plastic. We felt the catheter offered the advantage of no dilatation and anesthesia for most early pregnancies but was not suitable for terminating pregnancies beyond the sixth week of gestation.

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