Hysteroscopic Treatment of Cervical Pregnancy: A Scoping Review of the Literature

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ABSTRACT **Objective:** Many therapies have been proposed for cervical pregnancy (CP) treatment; however, there is no consensus on the best practice to adopt, mainly owing to the rarity of this condition and the lack of randomized controlled trials. Therefore, there are no clinical practice guidelines for the management of this patient set. We presented an English literature review about the hysteroscopic management of CP.

Data Sources: The literature review was performed according to the Preferred Reporting Items for Scoping Reviews. The search strategy aimed at identifying cases from the first patients tracked down to those diagnosed in May of 2021. We searched in PubMed, Scopus, Google Scholar, and MEDLINE databases. Mesh terms used included "Cervical Pregnancy," "Hysteroscopy," "Ectopic pregnancy," and "Resectoscopy."

Method of Study Selection: Case reports of randomized controlled trials, prospective controlled studies, prospective cohort studies, retrospective studies, case series, and case reports were considered eligible. Review, Letters to the Editor, and abstracts accepted at conferences were ruled out.

Tabulation, Integration, and Results: We found a total of 3572 articles in all analyzed databases. A total of 2480 articles viewed were duplicated and therefore ruled out. After screening and excluding nonpertinent articles, 109 were assessed for eligibility, and 19 were included in the analysis. All articles were single case reports, small case series with no criteria selection, randomization, or study planning. We classified them as follows: cases treated with 10 mm resectoscope, with or without pretreatments of previous CP hysteroscopic approach, and cases resolved with 5 mm hysteroscopy, with or without pretreatments of previous CP hysteroscopic approach.

Conclusion: The hysteroscopic method represents a feasible and safe approach to the CP treatment, although there are still some aspects to be clarified, such as the pretreatment need and the instruments' type and sizes based on the beta-subunit of human chorionic gonadotropin, pregnancy age, and dimension.

Keywords: Cervical ectopic pregnancy; Hysteroscopy; Resectoscopy

Cervical pregnancy (CP) is a rare form of ectopic pregnancy (EC) in which the blastocyst implants itself in the lining of the cervical canal. Among all pregnancies, the incidence is estimated between 1:16.000 and 1:18.000, and among ECs, the incidence is 1:1.000 [1]. In recent decades, the CP incidence raised probably owing to the increased maternal age and in vitro fertilization techniques [2].

Its etiology is unclear, and the risk factors are local endometrial lesions, local inflammation, and abnormal kinetics of gametes or embryos [3]. An early diagnosis is essential, and the ultrasounds represent the gold standard for identifying CP [4,5]. Several methods have been proposed to treat CP; however, there is no consensus on the best practice [6]. "Expectant management" can be considered for low or reduced serum beta-subunit of human chorionic gonadotropin (beta-hCG) levels and symptoms' concomitant absence.

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Regarding the pharmacological approach, methotrexate (MTX) is the most used drug, but there are no standardized dosing and administration protocols. MTX can be used alone or with additional therapies [7]. Otherwise, the standard surgical approach is dilation and evacuation, with additional measures [8], and hysterectomy is the last option [9]. The best method's choice depends on several factors, including the gestational age and the desire to preserve future fertility [10]. The use of hysteroscopic techniques was introduced approximately 10 years ago. This method could be an efficient and minimally invasive treatment that preserves fertility and, until now, has only been described in small case series [9]. In this paper, we present a review of the existing literature about CP hysteroscopic management.

Materials and Methods

We reviewed the English literature present in PubMed, Scopus, Google Scholar, and MEDLINE regarding the CP's hysteroscopic and resectoscopic management. Three authors, G.D.L, G.M., and S.S., independently performed the research articles' analysis. The scoping review was performed according to Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews [11−13].

The document was submitted to International Prospective Register of Systematic Reviews that currently does not accept registrations for scoping reviews.

Search Strategy

All databases mentioned earlier were systematically searched from the first tracked patients up to those diagnosed in May of 2021, with a combination of keywords: cervical pregnancy, hysteroscopy, ectopic pregnancy, and resectoscopy. All the articles were analyzed, evaluating the references contained therein.

Inclusion and Exclusion Criteria

Only original articles in English were evaluated. Case reports, randomized controlled trials, prospective controlled studies, prospective cohort studies, retrospective studies, and case series were considered eligible. Reviews, Letters to the Editor, and abstracts accepted at conferences were ruled out, but the review was analyzed to find additional cases.

Data Extraction

Two authors (G.D.L, G.M.) evaluated the study starting from the title and the abstract and then considered the entire work's reading. They found that the entire reference list omitted no sources and excluded duplicates; indeed, they rejected revisions that did not report the original data to avoid duplications. Subsequently, all the authors approved the final evaluation of the selected articles. According to the National Institutes of Health Quality Assessment Tool, an assessment of the quality of the individual articles was performed [14] (Table 1, Supplemental Table 1).

Study Selection

A description of cases reported in the literature was made. We divided the article selected into 4 different groups:

(1) Cases treated with 10 mm resectoscope with pretreatment
(2) Cases treated with 10 mm resectoscope without pretreatment
(3) Cases treated with a 5 mm hysteroscopy with pretreatment
(4) Cases treated with a 5 mm hysteroscopy without pretreatment

Results

A total of 3572 articles were found in all the databases analyzed, of which 2480 duplicates were excluded. After screening and excluding nonpertinent articles, 109 were assessed for eligibility, and 19 were included in the analysis (Fig. 1). These papers described the management of CP using operative hysteroscopy, with or without pretreatment.

Table 1

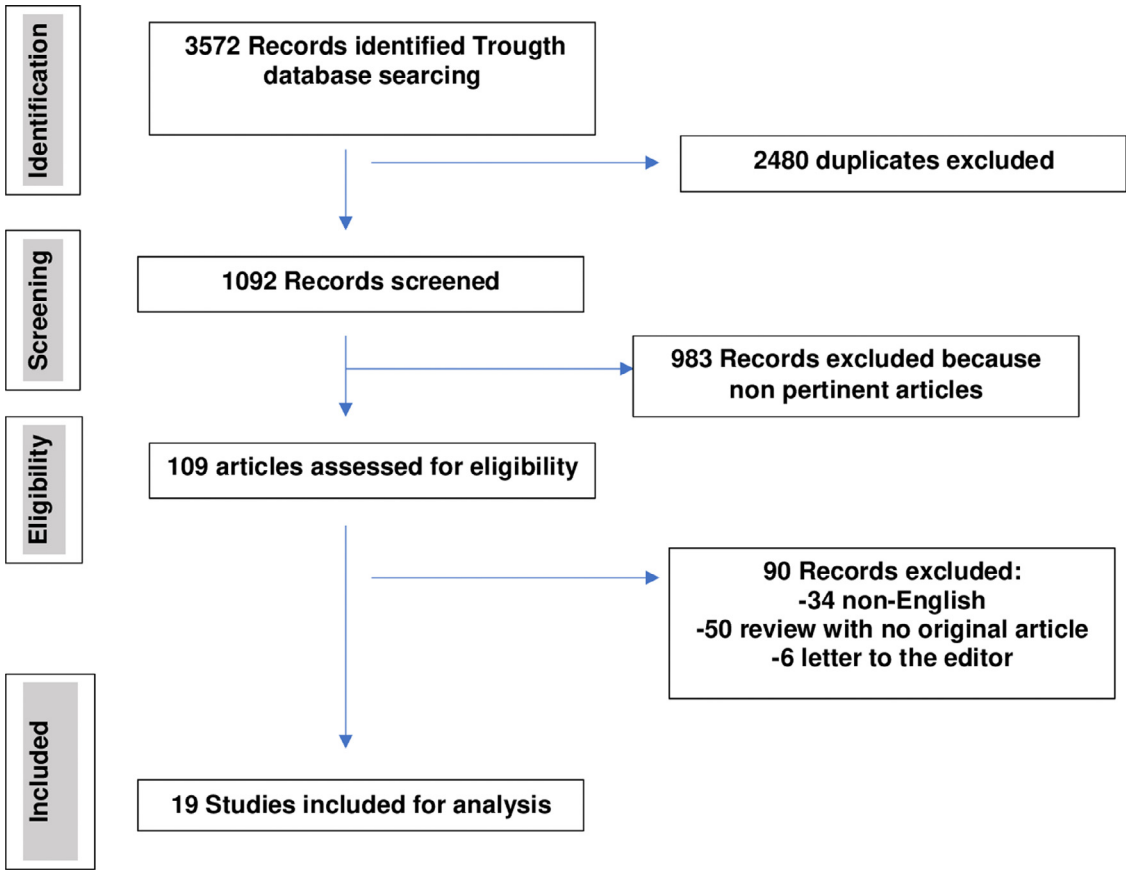
NIH Quality Assessment Tool for case series studies

XXX	Quality rating (good, fair, poor)		
	Poor	Fair	Good
Kim et al, (2008) [27]			+
Tanos et al, (2019) [28]			+
Mangino et al, (2019) [29]		+	
Stabile et al, (2020) [30]			+
Scutiero (2013) [31]			+
Matteo et al, (2016) [33]		+	
Mangino et al, (2013) [34]		+	
Masuda et al, (2006) [35]		+	
Subedi et al, (2016) [32]		+	
Kung et al (2003) [20]			+
Vilos et al, (2005) [21]		+	
Yang et al, (2007) [22]		+	
Lin et al, (2008) [15]		+	
Kofinas et al, (2012) [16]		+	
Di Spiezio et al, (2017) [18]		+	
Šijanović et al, (2013) [19]		+	
Radpour et al, (2004) [17]		+	
Imai et al, (2019) [23]			+
Ash et al,, (1996) [24]		+	
Hardy (2002) [25]		+	
Jozwiak et al, (2003) [26]		+	

NIH = National Institutes of Health.

Fig. 1

PRISMA flow diagram. PRISMA = Preferred Reporting Items for Systematic reviews and Meta-Analyses.



All articles were single case reports, small case series with no criteria selection, randomization, or study planning.

10 mm Resectoscope with Pretreatment

In this paragraph, we summarized the 6 articles (12 patients) reported in the literature about CP treated with resectoscope using MTX, temporary laparoscopic closure of the uterine arteries, or uterine arteries embolization (Table 2).

Methotrexate

Lin et al [15] described a case of a CP of 7 gestational weeks treated with systemic MTX and solved with resectoscope after the failure of medical treatment.

Kofinas et al [16] presented a case of CP at 6 gestational weeks and beta-hCG of 1500 mUI/mL treated with MTX, followed by intrasaccular administration of this drug at 8 weeks with beta-hCG of 3.500 mUI/mL owing to the increasing size of the EC. After the medical treatment failed, at 10 weeks, they decided to proceed with the hysteroscopic treatment using a 10 mm resectoscope.

In 2004 Radpour et al [17] reported a case of consecutive spontaneous CPs at 4 weeks of gestation and an initial level of beta-hCG of 435 mUI/mL. They gave a single dose of MTX and opted for conservative management after its administration. The hCG levels fell from 13 526 mIU/mL to 6481 mIU/mL.

In 1 month, the patient had excessive vaginal bleeding. After the first Foley catheter placement, the patient was taken to the operating room, where she underwent CP cauterization and insertion of another Foley' catheter. Di Spiezio Sardo et al [18] described a case of 5 + 5 gestational weeks CP treated with 3 doses of systemic MTX plus one administered inside the gestational sac with hysteroscopy, followed by definitive resolution with a 10 mm resectoscope. In 1 month, the beta-hCG was negative. Sijanovc et al [19,20] presented a case of solved with a resectoscopic rollerball after an unsuccessful systemic administration of MTX.

Artery-Blocking Methods

Kung et al [20] described 6 cases of CP treated with laparoscopic ligation of uterine arteries and subsequently hysteroscopic resection with a 21 French (Fr) resectoscope. The menstrual period returned to standard 30 to 90 days after the procedure.

Table 2

Ten mm resectoscope with pretreatment

Author	Case	Gestation wk	β-hCG	Pretreatment	Hysteroscopic approach	Outcomes
Lin et al, (2008) [15]	1	7	14.988 mUI/mL	50 mg IM MTX	10 mm resectoscope	β-hCG negative in 14 d
Kofinas et al, (2012) [16]	1	6 and 8	1.500 mUI/mL and 3.500 mUI/mL	IM MTX and intrasaccular MTX	10 mm resectoscope	The β-hCG decreased to the standard level (<5 mUI/mL) after 1 wk Conception 3 mo after surgery and a eutocic delivery at term
Radpour et al, (2004) [17]	1	4	435	MTX 50 mg IM	10 mm resectoscope	Normal pregnancy after one year
Di Spiezio et al, (2017) [18]	1	5 + 5	19.352 mUI/mL	IM MTX 100 mg, more intrasaccular hysteroscopically MTX, then 2 other administration of 100 mg of MTX IM	10 mm resectoscope	β-hCG negative in 1 mo
Šijanović et al, (2013) [19]	1	5 + 3	16.553, 5	MTX 50 mg IM	Monopolar rollerball. Not clear type of hysteroscope	β-hCG negative 3 d after surgery
Kung et al, (2003) [20]	6	6−9	17 150−126 334 mUI/mL	Laparoscopic ligation of uterine arteries	10 mm resectoscope	Normal menstrual period after 30−90 d after procedure,
Vilos et al, (2005) [21]	1	10	97.000 mUI/mL	MTX + UAE	10 mm resectoscope	β-hCG <5 mUI/mL after 54 d
Yang et al, (2007) [22]	1 (twin)	7	27.529 mUI/mL hCG 7 mUI/mL after 19 d	Intracervical Foley + UAE + temporary occlusion of common iliac arteries + MTX after hysteroscopy	8 mm resectoscope + rollerball	
Imai et al, (2021) [23]	9	5-6	2880−2970 mUI/mL	Temporary bilateral occlusion of uterine arteries 2−3 cm to hypogastric arteries	10 mm resectoscope	Normal menstrual period after 30−80 d after the procedure

hCG = human chorionic gonadotropin; IM = intramuscular; MTX = methotrexate; UAE = uterine artery embolization.

Table 3

Ten mm resectoscope without pretreatment

Author	Case	Gestation wk	β-hCG	Hysteroscopic approach	Outcomes
Ash et al, (1996) [24]	1	6	2.976 mUI/mL	10 mm resectoscope	β-hCG negative in 14 d
Hardy (2002) [25]	1	6	6.755 mUI/mL	10 mm resectoscope + rollerball	Conception 4 mo after surgery and a eutocic delivery at term
Jozwiak et al, (2003) [26]	1	3	152 mUI/mL, not mentioned at CP diagnosis	10 mm resectoscope	CT section at 38 wk, health baby
Kim et al, (2008) [27]	10	4–6	15.664 mUI/mL(median)	H_2O_2 and 10 mm resectoscope	5 uneventful pregnancies but subjected to surgical abortion
Tanos et al, (2019) [28]	1	5 + 4	1650 mUI/mL	10 mm resectoscope	Uneventful
Mangino et al, (2019) [29]	1	6 + 6	55 951 mUI/mL	first step 5 mm hysteroscope with twizzle second step 10 mm resectoscope	Conception 5 mo after surgery
Stabile et al, (2020) [30]	1	6 + 6	10 826 mUI/mL	first step 5 mm hysteroscope with twizzle second step 10 mm resectoscope	Complete resolution

CP = cervical pregnancy; CT = computed tomography; hCG = human chorionic gonadotropin.

Vilos et al [21] treated a 10-week CP with success.

Yang et al [22] described a twin CP of 7 gestational weeks admitted to the emergency room with massive bleeding. They attempted to treat this bleeding first with intracervical Foley, then with uterine artery embolization (UAE), but without success. Therefore, they opted for temporary occlusion of common iliac arteries followed by resectoscopy. Imai et al [23] reported a temporary bilateral laparoscopic uterine artery clipping technique with hysteroscopic transcervical resection of CP. The authors successfully treated 9 CPs. The patients were placed in the lithotomy position in these case series, and general anesthesia was induced. A laparoscopy was performed after accessing the retroperitoneum. The uterine artery was identified and occluded with an endoscopic clip at a distance of 2 to 3 cm from its origin. The hysteroscopy was performed with a 10 mm bipolar resectoscope, and the CPs were removed. After the procedures, the endoscopic clip was removed to resume blood flow.

10 mm Resectoscope without Pretreatment

Literature reports 4 papers (13 patients) describing CP treated and solved resolved only with one operative hysteroscopy using a 10 mm resectoscope (Table 3).

Ash et al [24] in 1996 described a case of CP, which was treated and resolved only with the use of a 10 mm resectoscope. The patient was admitted to the emergency department with vaginal bleeding that had lasted for several days. She was at 6 weeks of amenorrhea with a β-hCG of 2.976 mUI/mL. The transvaginal ultrasound (TVUS) showed a gestational sac inside the cervical canal, and the fetal heart activity was confirmed. The gestational sac diameter was 18mm, and the fetal pole was 4mm in length., An operative hysteroscopy was chosen, considering the early gestational age and the gestational sac volume. The operator injected a diluted intracervical vasopressin solution and placed a suture near the cervix to ligate the left uterine artery's cervical branch to prevent bleeding. A 27 Fr resectoscope was introduced into the endocervical canal under direct vision. The ectopic formation was systematically excised with the resection loop. The postoperative course was uneventful [24].

Similarly, Hardy et al [25] described the use of a resectoscope with a rollerball for a 6 gestational week CP for significant vaginal bleeding. The postoperative course was uneventful [25].

Jozwiak et al [26] reported a case of heterotopic CP after in vitro fertilization embryo transfer. A 37-year-old woman, 21 days after the Embryo Transfer of 2 embryos at the TVUS, presented a normal intrauterine pregnancy and the second gestational sac inside the cervical wall. Hysteroscopic resection of the CP was performed to preserve the intrauterine one. They used a 10 mm resectoscope and a rollerball to detach the EC without overstepping the internal cervical os. The postoperative course was uneventful. At 12

Table 4

Five mm hysteroscope with pretreatment

Author	Case	Gestation wk	β-hCG	Pretreatment	Hysteroscopic approach	Outcomes
Scutiero et al, (2013) [31]	5	6 to 9	15.482–74.684 mUI/mL	UAE	5 mm hysteroscope, with no anesthesia	β-hCG negative in 14 d
Subedi et al, (2016) [32]	1	3	9000 mUI/mL	UAE	Vacuum suction + 7 Fr (2.3 mm) hysteroscope	β-hCG negative in 4 wk
Matteo et al, (2006) [33]	1	6	14.141 mUI/mL	MTX 50 mg IM for 2 doses	5 mm hysteroscope	Integral cervix at the TVUS control
Mangino 2014[34]	1	6	2.023 mUI/mL	Intrasaccular and systemic MTX	5 mm hysteroscope	β-hCG negative in 15 d
Masuda et al, (2016) [35]	1	6	1551.9 mUI/mL	MTX 50 mg IM for 2 doses	5 mm hysteroscope	Ovulation 5 wk after the procedure
Stabile et al, (2020)[30]	2	6 5	4274 9747 mUI/mL	MTX IM 50 mg/m^2 of body surface	5 mm hysteroscope	Complete resolution

hCG = human chorionic gonadotropin; IM = intramuscular; MTX = methotrexate; TVUS = transvaginal ultrasound; UAE = uterine artery embolization.

gestational weeks, a McDonald cerclage was placed in the cervix to prevent cervical incompetence. The pregnancy's remainder was uneventful, and the patient delivered a healthy baby in the 38th week by cesarean section [26].

Kim et al [27] in 2008 proposed a case series of 10 CP managed with the resectoscope followed by intrauterine irrigation of 3.5% hydrogen peroxide (H_2O_2). After the procedure, an 18 Fr Foley catheter was inserted through the cervical canal, and the uterine cavity was irrigated slowly with 3.5% H_2O_2 solution, from 50 to 300 mL. In the end, an intracervical injection of vasopressin was performed. There were 6 pregnancies after the procedure in this patient group, one had a spontaneous miscarriage, and the other 5 had a surgical abortion [27].

Thanos et al used a 10 mm resectoscope with a bipolar loop preceded by in situ injections of diluted vasopressin to treat a CP. The moderate bleeding was noted 15 minutes after the operation, controlled by the local application of Surgicel absorbable hemostat and packing [28]. Mangino et al [29] showed a 2-step technique method to treat CP. In the first step, a 5 mm Bettocchi hysteroscope with 5 Fr bipolar electrode was adopted to identify and terminate the pregnancy; in the second step, a 10 mm resectoscope was used to remove the gestational sac and residual chorionic villi and coagulate the implantation site. The patient was discharged 24 hours after the procedure and became pregnant after 5 months. Stabile et al [30] described a CP case treated with 10 mm resectoscope without pretreatment. An intracervical Foley catheter was inserted after an initial partial resection phase with a 5 Fr bipolar electrode. A second step with 10 mm resectoscope was performed owing to persistent vaginal bleeding, leading to a complete CP removal.

5. *mm Hysteroscope with Pretreatment*

In literature, we found 6 papers describing CP solved using a 5 mm hysteroscope previously treated with a pretreatment: UAE or MTX (Table 4).

Uterine Arteries Embolization

Two articles in the literature described 6 cases of CP treated first with UAE and then with 5 mm hysteroscopic treatment.

Scutiero et al [31] presented a case series of 5 CP, all with a documented fetal cardiac activity at the TVUS; a 5 Fr bipolar electrode was introduced through the hysteroscope's operative channel, and excision of the EC was performed. The postoperative course was uneventful for all the cases [31]. Subedi et al [32] described a heterotopic pregnancy case after an in vitro fertilization treatment previously approached with UAE and then with vacuum suction and hysteroscopic removal of the CP, using a 7 Fr forceps.

Table 5

5 mm hysteroscope without pretreatment

Author	Case	Gestation wk	β-hCG	Hysteroscopic approach	Outcomes
Tanos (2018) [28]	3	6−7	930−13.790 mUI/mL	2.8 mm Bettocchi hysteroscope	Uneventful

hCG = human chorionic gonadotropin.

Methotrexate

The literature reports 4 cases of CP treated with a 5 mm hysteroscope after using utilizing MTX.

Matteo et al [33] described a CP managed with operative hysteroscopy with the previous use of MTX. The patient was a 38-year-old pregnant woman at 6 gestational weeks. The gestational sac was visualized in the cervical wall, the fetal heartbeat was documented, and the β-hCG was 14.141 mUI/mL. The patient received an intramuscular injection of MTX every other day for 4 days. After a 1-week interval, MTX treatment was repeated, and a drop in serum β-hCG levels was observed after the second cycle, reaching 1897 mUI/mL. Then the patient underwent operative hysteroscopy. The cervical canal was dilated with Hegar dilators, and the operator inserted a 5 mm office hysteroscope. He used a 5 Fr bipolar electrode to remove the gestational sac. After this procedure, a cautious endometrial and endocervical curettage was performed. The patient had an uneventful postoperative course, and a TVUS after 4 weeks described an intact cervix.

Mangino et al [34] in 2013 reported a case of a CP successfully treated with hysteroscopy after unsuccessful treatment with MTX. A nulliparous woman went to the emergency room with low abdominal pain without vaginal bleeding at 6 weeks of amenorrhea. The TVUS revealed a 6 mm gestational sac implanted in the isthmic cervical region, with a yolk sac but no cardiac activity, and the β-hCG was at 2023 mUI/mL. They administered an ultrasound-guided intrasaccular MTX injection, followed by an hCG rise to 3.979 mUI/mL and Gestational Sac increase in volume, with the appearance of an embryo pole and a heartbeat; for these reasons, they decided to perform a second systemic MTX dose. The following day, an additional TVUS still displayed an 18 mm gestational sac with persistent cardiac activity, so the authors arranged for a hysteroscopic resection. They used a 5 mm Bettocchi hysteroscope with no previous dilatation of the cervix; they introduced through the operative channel a 5F bipolar electrode and resected the implantation site under direct visualization of the chorionic villi. The postoperative course was uneventful, and the β-hCG became negative in 15 days.

Masuda et al [35] described a case of a CP treated with 2 doses of MTX. Despite a >25% decrease in β-hCG, the size of the gestational sac remained unchanged, and peritrophoblastic flow persisted; therefore, the author decided to attempt the surgical approach. They used a 5 mm hysteroscope with resolution. The patient conceived after 9 weeks with an embryo transfer.

Stabile et al [30] described 2 cases of CP treated with a 5 mm hysteroscope and pretreatment with MTX, which allowed a complete resolution of CP.

5 mm Hysteroscope without Pretreatments

To the best of our knowledge, the unique cases of CP resolved only with the use of a 5 mm hysteroscope are the 3 described by Tanos et al in a recent review in 2018 [28] (Table 5).

This article presented a case series of 4 CP treated with hysteroscopy, 3 of these resolved with a 2.8 mm hysteroscope with a 5 Fr working channel and the last one with the aid of a 10 mm resectoscope.

The gestational age was between 5 and 7 weeks, the β-hCG varied from 930 mUI/mL to 13.790 mUI/mL. All patients underwent diagnostic and operative hysteroscopy in one session. In 2 of these cases, they injected diluted antidiuretic hormone (ADH) and, in another case, diluted adrenaline around the ectopic tissue before the surgery to prevent bleeding and facilitate the excision.

In the first procedure, they used 5 Fr scissors and hydrodissection. Hemostasis was achieved using 5 Fr bipolar probe coagulation. In the second one, they injected diluted adrenaline without enough hemostasis, so they applied a bipolar electrode to coagulate the deeper tissue layers.

Finally, the third case was a collapsed pregnancy sac and long-standing missed pregnancy of approximately 10 days, so the hydrodissection was enough to detach the fragile conceptus, and then they used diluted adrenalin and 5 Fr bipolar probe for hemostasis.

Discussion

CP is a rare condition, but its incidence has increased in recent decades [2].

Literature reports a multitude of different protocols for pharmacological, surgical, and also combined CP treatments.

Various conservative treatments have been proposed, such as curettage followed by local administration of prostaglandin [25]; systemic administration of MTX and hysteroscopic resection [33]; administration of systemic MTX, followed by UAE; local tamponade by inflated Foley

catheter balloon [36]; UAE, hysteroscopic resection [31]; UAE followed by curettage [37]; and hysteroscopic resection followed by intrauterine irrigation of H_2O_2 [27].

In the several cases described, more than one step was necessary to resolve this condition. According to a recent review, an additional procedure was required in about 6% of the cases [38].

However, no randomized controlled trials compared the different managements' efficacy owing with this condition's rarity.

Medical therapy with systemic MTX administration was the most frequent approach in hemodynamically stable women. However, there was no evidence to support systemic rather than local administration [4]. Inclusion criteria for MTX use included a β-hCG of <5000 mUI/mL [39] and no visible fetal heartbeat at the TVUS [40].

MTX was not always efficacious even within the inclusion criteria; the effects were reduced if the β-hCG ranges between 5000 and 10 000 mUI/mL, the gestational age was over the 9th week, or the embryo's crown-rump length exceeded 10 mm [40]. Besides, the MTX administration presented side effects [41,42], mainly when used with other nephrotoxic drugs [43]: dermatologic toxicity [44] and hematological toxicity, when used at high dosage.

In this regard, surgical approaches permitted us to reduce the time to well-being, with fewer controls and a shorter follow-up [29]. Indeed, a lot of CPs were treated with operative hysteroscopy after an unsuccessful use of MTX.

As a minimally invasive procedure, we can consider hysteroscopy an essential alternative to preserve women's fertility [34]. In the early 1990s, when the hysteroscopic technique was first discussed [25], the risk of bleeding was higher because CP diagnosis was not as early as it is today. Many precautions were unavailable, such as laparoscopic uterine artery ligation [19] or transfemoral UAE [19]. However, it is unclear whether all of these described safety precautions were necessary [34]. Ash [24] and Hardy [25] did not report any complications describing a CP treated only with a resectoscope. Uterine artery ligation can cause long-term hypofertility and diminish future fertility [45].

In the literature, few CP cases were handled only with noninvasive endoscopic treatment, and there were no comprehensive case series or case control studies demonstrating the effectiveness and the safety of this approach, but the single case reports gave promising results.

The uncleared aspects remained the type and size of instruments needed and whether pretreatment in correlation to β-hCG, pregnancy age, and sac dimension could be helpful. To our knowledge, no study in the literature compared these aspects. We found 19 cases concluded without previous drug administration.

The 10 mm resectoscopic approach could have some disadvantages; for example, the need to dilate the cervical canal could be critical owing to an EC inside the canal, which would cause massive hemorrhage. On the other hand, it has advantages: a greater distension medium flow, a better view, and a more extensive and more effective electrode.

The 5 mm hysteroscope may be less effective (in cases of ongoing bleeding or more advanced gestational stage pregnancies that require instruments with better vision, greater washing capacity, and higher coagulation capacity thanks to the use of larger loops, like the classic resectoscope), but safer, because it avoids the cervical dilation phase, and it could also be used in an office setting [30]. Nevertheless, the operating room gives the advantages of closer monitoring, immediate access to blood transfusion, and the possibility to convert the procedure in case of complication. For this reason, it cloud be desirable to use a 5mm set but only in the operating room.

Tanos et al [28] described, in 3 cases, successful treatments with only a 5 mm hysteroscope without previous use of MTX or another pretreatment. Another possibility could be injecting vasoconstrictor agents as adrenaline, vasopressin, or ADH around the ectopic gestational sac before the procedure [25,27,28], using a 5 mm hysteroscope, or a double-step approach with a resectoscopy preceded by an operative 5 mm hysteroscopy.

The new 5 mm resectoscope used without previous cervical dilatation could be the correct answer to some of these questions.

Our study's limitations are related to the kind of material analyzed, only case reports or case series without randomized controlled trials to evaluate the hysteroscopic treatment actual effectiveness; furthermore, publication bias should be the absence of hysteroscopic treatment failure reports. The strength is represented by analyzing all the cases treated with hysteroscopy, classified according to the instrument used and the execution or not of a pretreatment, to face future randomized controlled trials procedures.

Conclusions

CP is a rare and dangerous condition that can lead to dire consequences such as a lifesaving hysterectomy. In recent years, a conservative approach employing hysteroscopic treatment has been used with success.

As described in our review, this approach is safe with good outcomes and reproducible.

Furthermore, many of the other methods described are multimodal (MTX + hysteroscope), and often hysteroscopy is only a second step after medical therapy failure. This issue leads to a lengthening of the healing times. The median hospitalization in this patient set was 9.8 $\pm$ 3 days, and the uterine mass disappearance occurred at 12.9 $\pm$ 6.9 weeks[3].

In our opinion, transforming the treatment from multimodal to single mode (5 mm hysteroscope $\pm$ 10 mm resectoscope) could reduce hospitalization times, ensure faster fertility recovery, and allow CP resolution in a single surgical step.

Aspects such as the type and size of instruments needed, whether pretreatment correlates with β-hCG, pregnancy's age, and dimension remain to be further investigated.

Owing to this pathology incidence, further multicentric studies and randomized clinical trials are essential to manage this issue better and define a shared and data-based approach to CP.

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Supplemental Table 1

Supplemental NIH Quality Assessment Tool for case series studies

	Kim et al (2008) [27]	Tanos et al (2018) [28]	Mangino et al (2019) [29]	Stabile et al (2020) [30]	Scutiero et al (2013) [31]	Matteo et al (2006) [33]	Mangino et al (2013) [34]	Masuda et al (2016) [35]	Subedi et al (2016) [32]	Kung et al (et al) (2003) [20]	Vilos et al (2005) [21]	Yang et al (2007) [22]	Lin et al (2008) [15]	Kofinas et al (2012) [16]	Di Spiezio Sardo 2017 [18]	Šijanović [19]	Radpour 2004 [17]	Imai 2019 [23]	Ash 1996 [24]	Hardy 2002 [25]	Jozwiak 2003 [26]
1. Was the study question or objective clearly stated?	Y	Y	Y	N	Y	N	N	N	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
2. Was the study population clearly and fully described, including a case definition?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3. Were the cases consecutive?	Y	Y	NA	Y	Y	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	CD	Y	NA	NA	NA
4. Were the subjects comparable?	Y	Y	NA	Y	Y	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	Y	NA	NA	NA
5. Was the intervention clearly described?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6. Were the outcome measures clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7. Was the length of follow-up adequate?	Y	Y	Y	Y	Y	Y	CD	CD	CD	Y	CD	Y	Y	Y	Y	Y	Y	Y	CD	Y	Y
8. Were the statistical methods well-described?	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9. Were the results well-described?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Quality rating (good, fair, poor)	Good	Good	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair

CD = cannot determine; Fair = 4−6 criteria; Good = 7−9 criteria; NA = not applicable; NIH = National Institutes of Health; NR = not reported; Poor = 0−3 criteria.