Research Article

A Clinicopathologic Analysis of Decidual Polyps: A Potentially Problematic Diagnosis

Juan Zou,1,2 Ying He,1,2 Huiling Chen,2,3 Peng Wang,4 Xue Xiao,2,3 and Shanling Liu2

1Department of Pathology, West China Second University Hospital, Sichuan University, Chengdu 610041, China
2Key Laboratory of Birth Defects and Related Diseases of Women and Children (Sichuan University), Ministry of Education, West China Second Hospital, Sichuan University, Chengdu 610041, China
3Department of Gynecology and Obstetrics, West China Second University Hospital, Sichuan University, Chengdu 610041, China
4Department of Academic Affairs, West China School of Medicine, Sichuan University, Chengdu 610041, China
5Department of Medical Genetics, West China Second University Hospital, Sichuan University, Chengdu 610041, China

Correspondence should be addressed to Xue Xiao; xuexuxiaov@163.com and Shanling Liu; sunny630@126.com

Received 17 November 2021; Revised 7 January 2022; Accepted 14 February 2022; Published 11 April 2022

Academic Editor: Federico Giorgio Ferrari

Copyright © 2022 Juan Zou et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Objective. The decidual polyp is a special cervical polyp that is not systemically reported or well known. The aim of this study was to describe the clinicopathologic features of the decidual polyps observed at the West China Second University Hospital of Sichuan University between 2015 and 2020 and to spread awareness of them. Methods. Two hundred and fifty cases of decidual polyps, accounting for 45.45% (250/550) of all cervical polyps identified during pregnancy, were reviewed. The patients were followed up until the end of their pregnancies, which delivered <28 weeks and between 28 and 37 weeks, and full-term delivery. The t-test or nonparametric test was used to measure the data, and the chi-square test was used for counting data. Statistical significance was set at p < 0.05. Results. Most of the decidual polyps occurred during the first trimester, with a median patient age of 33 years. The polyps were both singles and multiples and located at the cervix, with a long stalk, and a median diameter of one centimeter. The gross morphological appearance varied from polypoid to lingulate, and they were fragile and bled easily. Microscopically, the decidual polyps showed diffuse glandular secretion as well as decidual changes in the stromal cells. They could be divided into two subtypes: decidua fragment and decidua with endometrial polyp formation. Seventy-three patients who went on to have further pregnancies were followed until the end of the study period. Twenty-one (21/73, 28.77%) of them had adverse pregnancy outcomes (12 cases delivered <28 weeks and 9 cases delivered between 28 and 37 weeks). Conclusions. The data showed that the decidual polyp was the second most common cervical polyp during pregnancy, and its incidence was associated with adverse pregnancy outcomes. Thus, this type of polyp should be considered in cervical polypectomy specimens from pregnant women. A more uniform and accurate pathological diagnosis, including the thrombus status and division subtype, could provide the basis for obstetricians to promote treatment improving pregnancy outcomes.

1. Introduction

Decidual polyps are a common condition that has not been well reported. Prior to this study, less than 100 cases have been identified [1–11]. Most of these are case reports and small sample reports. Decidual polyps mainly occur during pregnancy, especially during the early and middle stages. However, their pathogenesis is unclear. Possible reasons for their occurrence may be an endometrial overreaction stimulated by high levels of estrogen and progesterone, and an abnormality of the cervical canal, including malformation and insufficiency [1, 12]. Decidual polyp formation may be a pathologic process or a transient physiological change during pregnancy, and polyps can resolve spontaneously in some patients [1, 2]. They have been reported to increase the risk of adverse pregnancy outcomes [6, 7]. Most decidual polyps are misdiagnosed as endocervical polyps by obstetricians, and currently, there is no standardized treatment...
for them [13]. The main treatments are polypectomy via a digital polypectomy or laser excision, or a loop electrosurgical excision procedure (LEEP). Nevertheless, conservative treatment is not frequently used [1–3, 6–11]. Errors in pathological diagnoses are often caused by limited information about the specimens, including their anatomical origin. Therefore, diagnostic terms vary widely and include decidua, endometrial polyp with decidual change, and endocervical polyp with decidual change [10]. Most studies have shown that the lesion was linked with the uterine cavity and that the pathological morphology was typical of the endometrium during pregnancy, and they also refer to interstitial decidual changes accompanied by glandular hypersecretion or secretion exhaustion [1–3, 7]. Some pathologists and obstetricians lack a unified understanding of decidual polyps, so there are discrepancies in the diagnoses. Due to the potential for decidual polyps to contribute to adverse pregnancy outcomes, it is imperative to develop a standardized pathological diagnosis.

Hence, the goal of the current study was to review all the cases of decidual polyps received in the department over a five-year period and to characterize the clinical and pathological features of this potentially problematic condition.

2. Materials and Methods

2.1. Case Selection. A search of the pathology data dated from 2015 to 2020 at the West China Second University Hospital of Sichuan University was performed, using the keywords “cervical polyp” or “decidua” and “pregnancy.” All the available hematoxylin- and eosin-stained slides were reviewed, the cervical polyps that only contained decidua were identified, and the clinical follow-up information was confirmed. The study was approved by the ethics committee of the hospital, and informed consent was not required because the data were anonymized.

Clinical data, including age, chief complaint, gestational weeks of diagnosis at polypectomy, patients' personal medical history, complications of pregnancy, physical examination, colposcopy, ultrasonic data, and the therapeutic schedule were obtained from the electronic medical records or the referring pathologists, obstetricians, or patients.

2.2. Histopathology. A decidual polyp (synonymous for decidua prolapse or extruded fragment of decidua) is described as the presence of expelled fragments of the decidua at the cervix [14]. Both the gland and stroma exhibit decidual changes. Additionally, concomitant characteristics that are exhibited include endometrial polyps, erosion, inflammation, necrosis, hemorrhage, and thrombi.

2.3. Statistics and Bioinformatics. The patients were followed until the end of their pregnancies, which delivered <28 weeks and between 28 and 37 weeks, and full-term delivery. SPSS 20.0 for Windows was used to analyze the data. A t-test or nonparametric test was used to measure the data and the chi-square test used for counting data. Statistical significance was set at \( p < 0.05 \).

3. Results

3.1. Clinical Features. Between 2015 and 2020, there were 2,952 cases of cervical polyps. Of these, 550 cervical polyps occurred during pregnancy, and they included 250 cases of decidual polyps (250/550, 45.45%). The excluded 300 cases comprised 290 endocervical polyps (290/550, 72.82%) and 10 other lesions. Patient information for 33 cases of endocervical polyps was retained to compare against the decidual polyp group.

The median age of the 250 patients with decidual polyps was 33 years (ranging from 21 to 44 years). Of them, 208 cases were diagnosed in the first trimester, 40 in the second trimester, and 2 in the third trimester (overall ranging from the 4th week to the 32nd week). In addition, 42% (105/250) of the patients had a complaint of vaginal spotting. We found 8 cases of systemic comorbidities (2 cases of thrombocytopenia, 4 cases of hypothyroidism, 1 case of myasthenia gravis, 1 case of thalassemia), 20 cases of gynecological comorbidities (6 cases of uterine myoma, 4 cases of ovarian cyst, 10 cases of vaginitis), and 9 cases of pregnancy complications (7 cases of gestational diabetes, 1 case of gestational hypertension, 1 case of intrahepatic cholestasis of pregnancy). Progesterone was used in 13 pregnancies, antibiotics in 10, asthma medication in 1, and aspirin in 1. With respect to the identification of the polyps, 134 cases were diagnosed accidentally due to artificial abortion for nonmedical reasons, 43 were discovered during a curettage for embryo arrest, and the remaining 73 were followed up until pregnancy termination after a polypectomy (Table 1).

3.2. Ultrasonic Examination, Vaginal Cervical Examination, and Colposcopy. Of the included patients, 8.8% (22/250) got a positive ultrasonography. A strip hypoechoic lesion in the cervical canal showed close relation to the uterine cavity not only through the morphological structure but also the blood supply. The positive rate of ultrasonography in term delivery group was lower than that in adverse outcome group (\( p = 0.028 \)) (Figure 1). Meanwhile, 87.20% (218/250) underwent a vaginal cervical examination, and 8.40% (21/250) underwent a colposcopy. The decidual polyps were single or multiple, ranging from one to three in number. Most of them were polypoid or lingulate with a thick stem in the cervical canal. The polyp surfaces were described as pink and fragile, and they bled easily. In some cases, the presence of the necrotic-appearing tissue was confirmed by a positive acetowhite test (Figure 2). A cervical cytology examination was performed in 85 patients, with 14.12% (12/85) having positive atypical squamous cells of an undetermined significance or low-grade squamous intraepithelial lesion results, while the remaining results were negative.

3.3. Treatment Schedule. All 250 patients in the study had undergone a polypectomy without anti-infection therapy. Most of them (199/250, 79.6%) underwent the polypectomy immediately after the polyp discovery, with an interval ranging from 2 to 14 weeks between the two. During this time, there was no prominent change in the polyp diameters.
Table 1: Summary of the clinic-pathological features of the decidual polyp.

|                               | Term birth \( n = 52 \) | Delivered 28–37 weeks \( n = 9 \) | Delivered \(<28 \) weeks \( n = 12 \) | \( p \) | Artificial abortion \( n = 134 \) | Embryo arrest \( n = 43 \) | Total \( n = 250 \) |
|-------------------------------|--------------------------|-----------------------------|-----------------------------|------|--------------------------|--------------------------|--------------------------|
| **Clinical information**      |                          |                             |                             |      |                          |                          |                          |
| Age (y)                       | 31 (27.5, 33.5)          | 32 (30, 35)                 | 31.5 (29.5, 33.5)           | 0.116| 33 (30, 37)              | 34 (30, 37)              | 33 (29.75, 36)           |
| G                             | 2 (1, 2)                 | 2 (1, 2)                    | 2 (1, 2.5)                  | 0.634| 2 (2, 3)                 | 2 (1, 3)                 | 2 (1, 3)                 |
| P                             | 0 (0, 1)                 | 1 (0.1)                     | 1 (0.1)                     | 0.825| 1 (1, 1)                 | 0.5 (0, 1)               | 1 (0.1)                  |
| Systemic comorbidities        |                          |                             |                             |      |                          |                          |                          |
| Gynecological comorbidities   |                          |                             |                             |      |                          |                          |                          |
| Artificial abortion           | 6 (2.4%)                 | 0 (0%)                      | 2 (0.8%)                    | 0.466| 0 (0%)                   | 0 (0%)                   | 8 (3.2%)                 |
| Embryo arrest                 | 6 (2.4%)                 | 0 (0%)                      | 5 (2.0%)                    | 0.013| 8 (3.2%)                 | 1 (0.4%)                 | 20 (8%)                  |
| **Diagnosis information**     |                          |                             |                             |      |                          |                          |                          |
| Medication history            | 7 (2.8%)                 | 1 (0.4%)                    | 2 (0.8%)                    | 0.931| 9 (3.6%)                 | 6 (2.4%)                 | 25 (10%)                 |
| Pregnancy complications       | 6 (2.4%)                 | 2 (0.8%)                    | 0 (0%)                      | 0.264| 1 (0.4%)                 | 0 (0%)                   | 9 (3.6%)                 |
| Colporrhagia                  | 41 (16.4%)               | 7 (2.8%)                    | 8 (3.2%)                    | 0.665| 34 (13.6%)               | 15 (6%)                  | 105 (42%)                |
| Ultrasonic                    | 1 (0.4%)                 | 2 (0.8%)                    | 2 (0.8%)                    | 0.028| 13 (5.2%)                | 4 (1.6%)                 | 22 (8.8%)                |
| Leucorrhea                    | 15 (6%)                  | 1 (0.4%)                    | 3 (1.2%)                    | 0.532| 42 (16.8%)               | 9 (3.6%)                 | 69 (27.6%)               |
| Blood routine                 | 17 (6.8%)                | 2 (0.8%)                    | 4 (1.6%)                    | 0.814| 62 (24.8%)               | 22 (8.8%)                | 107 (42.8%)              |
| Colposcopy                    | 13 (5.2%)                | 3 (1.2%)                    | 3 (1.2%)                    | 0.867| 0 (0%)                   | 0 (0%)                   | 19 (7.6%)                |
| Cervical cytology             | 4 (1.6%)                 | 2 (0.8%)                    | 3 (1.2%)                    | 0.163| 3 (1.2%)                 | 0 (0%)                   | 12 (4.8%)                |
| Discovery by accident         | 4 (1.6%)                 | 1 (0.4%)                    | 1 (0.4%)                    | 0.683| 82 (32.8%)               | 23 (9.2%)                | 110 (44%)                |
| Discovery week (w)            | 11.5 (9, 15.5)           | 16 (9, 16)                  | 8 (5.5, 11)                 | 0.033| 6 (6, 7)                 | 8 (7.75, 9)              | 7 (6, 9)                 |
| The first trimester           | 21 (8.4%)                | 4 (1.6%)                    | 8 (3.2%)                    | 0.382| 133 (53.2%)              | 42 (16.8%)               | 208 (83.2%)              |
| The second trimester          | 30 (12%)                 | 4 (1.6%)                    | 4 (1.6%)                    | 0.010| 13 (5.2%)                | 1 (0.4%)                 | 40 (16%)                 |
| The third trimester           | 1 (0.4%)                 | 1 (0.4%)                    | 0 (0%)                      | 0.017| 1 (0.4%)                 | 0 (0%)                   | 2 (0.8%)                 |
| No. of polyp.                 | 1 (1, 1)                 | 1 (1, 1)                    | 1 (1, 1)                    | 0.817| 1 (1, 1)                 | 1 (1, 1)                 | 1 (1, 1)                 |
| Diameter of polyp             | 2 (1.5, 3)               | 1.5 (1, 2.5)                | 2.5 (1.25, 4)               | 0.574| 1 (0.5, 1.5)             | 0.5 (0.5, 1)             | 1 (0.5, 2)               |
| Endometrial polyp             | 15 (6%)                  | 1 (0.4%)                    | 3 (1.2%)                    | 0.532| 42 (16.8%)               | 11 (4.4%)                | 72 (28.8%)               |
| Endometrial fragment          | 37 (14.8%)               | 8 (3.2%)                    | 9 (3.6%)                    | 0.532| 92 (36.8%)               | 32 (12.8%)               | 178 (71.2%)              |
| Inflammation                  | 52 (20.8%)               | 9 (3.6%)                    | 12 (4.8%)                   | NA   | 131 (52.4%)              | 42 (16.8%)               | 246 (98.4%)              |
| Hemorrhage                    | 15 (6%)                  | 3 (1.2%)                    | 3 (1.2%)                    | 0.916| 31 (12.4%)               | 5 (2.0%)                 | 57 (22.8%)               |
| Erosion                       | 49 (19.6%)               | 9 (3.6%)                    | 11 (4.4%)                   | 0.698| 119 (47.6%)              | 37 (14.8%)               | 225 (90%)                |
| Necrosis                      | 20 (8%)                  | 4 (1.6%)                    | 3 (1.2%)                    | 0.606| 46 (18.4%)               | 12 (4.8%)                | 85 (34%)                 |
| Thrombus                      | 2 (0.8%)                 | 2 (0.8%)                    | 3 (1.2%)                    | 0.013| 32 (12.8%)               | 3 (1.2%)                 | 42 (16.8%)               |
| **Histopathological features**|                          |                             |                             |      |                          |                          |                          |
| Decidua                       | 23 (9.2%)                | 1 (0.4%)                    | 5 (2.0%)                    | 0.171| 43 (17.2%)               | 20 (8%)                  | 92 (36.8%)               |
| Endometrial polyp             | 23 (9.2%)                | 7 (2.8%)                    | 4 (1.6%)                    | 0.106| 59 (23.6%)               | 13 (5.2%)                | 106 (42.4%)              |
| Endocervical polyp            | 6 (2.4%)                 | 1 (0.4%)                    | 3 (1.2%)                    | 0.460| 32 (12.8%)               | 10 (4%)                  | 52 (20.8%)               |

G, gravid; P, pregnancy.
In total, 186 patients underwent a polypectomy in the first trimester, 62 in the second trimester, and 2 in the third trimester.

3.4. Pathologic Features. Fifty-two patients were diagnosed with endocervical polyps at the initial diagnosis, with a misdiagnosis rate of 20.8%. Of the remaining 198 cases, the initial pathologic results were decidua (92/250, 36.80%) and endometrial polyps with decidual change (106/250, 42.40%). The surfaces of all the resection specimens were pink, exhibited erosion, and the cut surfaces were soft and fragile. The median diameter was 1 cm (ranging from 0.5 cm to 5.5 cm). Microscopically, the stroma cells developed abundant pink and edema cytoplasm with well-defined cellular borders, and the glands showed different degrees of secretory reaction from hypersecretory reaction to secretory exhaustion (Figures 3(a)–3(c)). Some of the concomitant characteristics included endometrial polyp formation (n = 72), erosion (n = 225), inflammation (n = 246), necrosis (n = 85), hemorrhage (n = 57), and thrombi (n = 42) (Figures 3(d)–3(i)). The decidual polyps were divided into two groups based on the concomitant characteristics of the endometrial polyp formation: type A, decidua fragment, and type B, decidua with endometrial polyp formation. The number of deliveries in pregnancies with type A was greater than that in type B, and the polyp diameter of type B was larger than that of type A (Table 2).

3.5. Follow-Up and Analysis. The 73 patients whose pregnancies continued were followed until the pregnancy came to an end. Of these, 21 (21/73, 28.77%) patients experienced adverse pregnancy outcomes (12 cases delivered <28 weeks and 9 cases delivered between 28 and 37 weeks). There were no significant differences in pregnancy outcome, gestational age at polyp discovery, or premature rupture of membranes between the two subtypes (Table 3). Detailed information on the 21 patients is presented in Table 4.
A comparison was also made between the 21 patients in the decidual polyp group and 33 patients with endocervical polyps who continued their pregnancies. There were some statistically significant differences in the clinicopathological characteristics between the two groups (Table 5). The decidual polyp group had a larger polyp diameter (2.0 cm vs. 1.0 cm, \( p < 0.001 \)), an earlier detection time (11 weeks vs. 17 weeks, \( p < 0.001 \)), a higher proportion and a wider range of decidual-like changes (100% vs. 12.1% \( p < 0.001 \)), and a higher rate of adverse pregnancy outcomes (28.8% vs. 6.1%, \( p < 0.05 \)). Granulation tissue hyperplasia (81.8% vs. 6.8%, \( p < 0.001 \)) and glandular hyperplasia (30.3% vs. 0%, \( p < 0.001 \)) were also far more common in endocervical polyps (Figure 4).

Some pathological features were associated with a poor prognosis in the decidual polyp group with a continued pregnancy, one of them being thrombosis. The incidence of adverse outcomes was higher in patients with thrombosis than in nonthrombosis patients (83.3% vs. 16.7%, \( p < 0.05 \)), and it may well be the main pathological feature that affects prognosis (Table 6).

4. Discussion

This is the largest retrospective study on decidual polyps, and, according to the data, the decidual polyp is the second most common cervical polyp during pregnancy and is related to adverse pregnancy outcomes. There was a statistically significant difference in decidual polyps complicated with gynecological diseases in different pregnancy outcomes (\( p = 0.013 \)), vaginal inflammation is the main one among these gynecological diseases, and there may be a correlation...
between inflammation and the development of decidual polyps. It accounts for 45.45% (250/550) of all cervical polyps during pregnancy and is consistent with the proportion of 41.41% (41/99) reported in other research [6]. However, the decidual polyp has a lower rate of diagnosis because the initial pathologic impressions are typically erroneous or inaccurate. The results therefore suggest that decidual polyps are a common but easily overlooked condition during pregnancy, requiring more attention and further research by obstetricians and pathologists.

Though often mistaken for endocervical polyps, the prognosis of endocervical polyps and decidual polyps is not the same. Adverse pregnancy outcomes were higher in the decidual polyp group than the endocervical polyp group (28.7% vs. 6.1%). It has already been reported that there is a difference between decidual polyps and endocervical polyps in delivered <28 weeks (12.2% vs. 0%) and 28–37 weeks delivery (34.2% vs. 4.8%) [6], and several studies have concluded that decidual polyps are associated with adverse pregnancy outcomes [3, 6, 7, 11]. The higher risk of adverse pregnancy outcomes after a polypectomy was further confirmed by Tokunaka (19/41, 46.4%) and Fukuta (19/52, 36.54%) [6, 7], and Zhang reported an adverse pregnancy outcome in six (6/11, 54.5%) cases with anti-inflammatory conservative management [11]. Due to the increased risk of adverse pregnancy outcomes, the decidual polyp should be treated with care.

In this study, decidual polyps were divided into two subtypes, namely decidua fragment, type A, and decidua with endometrial polyp formation, type B, and it was found that the adverse pregnancy outcome rate of type A (18/54, 33.33%) was higher than that of type B (3/18, 16.67%) (p = 0.408) although the difference was not statistically significant. It is interesting that there was no case of type A in the third trimester, and it seems that this subtype may have a different pathogenesis. In addition, the number of births with type A was greater than the number with type B, and the polyp diameter of type B was larger than that of type A. It seems clear that more detailed classification and research on endometrial polyp formation could enhance the understanding of decidual polyps, and further research on this condition to improve pregnancy outcomes is highly recommended.
### Table 4: Case presentation of decidual polyps with adverse outcomes.

| No. | Age (y) | G | P | Discovery week (w) | Diameter (cm) | PROM Delivery week (w) | Endometrial polyp | Inflammation | Hemorrhage | Thrombus | Erosion | Necrosis |
|-----|---------|---|---|-------------------|---------------|-----------------------|------------------|--------------|------------|----------|---------|---------|
| 1   | 34      | 4 | 1 | 16                | 2             | NO                    | 21               | NO           | NO         | YES      | NO      | NO      |
| 2   | 35      | 2 | 1 | 16                | 1.5           | YES                   | 28 + 2           | NO           | YES        | NO       | NO      | YES     |
| 3   | 37      | 3 | 1 | 9                 | 1.5           | NO                    | 34 + 2           | NO           | NO         | NO       | NO      | YES     |
| 4   | 32      | 1 | 0 | 9                 | 2.5           | YES                   | 33 + 2           | NO           | YES        | YES      | YES     | YES     |
| 5   | 30      | 3 | 1 | 16                | 2             | NO                    | 32               | NO           | NO         | NO       | NO      | NO      |
| 6   | 32      | 1 | 0 | 32                | 4             | YES                   | 32               | YES          | YES        | NO       | NO      | NO      |
| 7   | 34      | 5 | 1 | 8                 | 0.5           | YES                   | 21 + 4           | NO           | NO         | NO       | NO      | YES     |
| 8   | 32      | 1 | 0 | 8                 | 5             | YES                   | 24 + 1           | YES          | NO         | NO       | NO      | NO      |
| 9   | 29      | 1 | 0 | 13                | 5             | NO                    | 16               | NO           | NO         | NO       | NO      | YES     |
| 10  | 30      | 2 | 0 | 6                 | 3             | YES                   | 15               | YES          | NO         | NO       | NO      | YES     |
| 11  | 30      | 1 | 0 | 5                 | 1             | YES                   | 26 + 6           | NO           | YES        | NO       | NO      | YES     |
| 12  | 30      | 1 | 0 | 17                | 1.5           | YES                   | 34 + 1           | NO           | YES        | NO       | NO      | YES     |
| 13  | 34      | 2 | 1 | 5                 | 3.7           | YES                   | 34 + 4           | NO           | NO         | NO       | NO      | YES     |
| 14  | 42      | 2 | 1 | 8                 | 2             | NO                    | 36 + 1           | NO           | NO         | NO       | NO      | YES     |
| 15  | 31      | 2 | 1 | 5                 | 3             | YES                   | 22 + 3           | NO           | YES        | YES      | YES     | NO      |
| 16  | 33      | 3 | 1 | 7                 | 1             | NO                    | 8                | NO           | YES        | NO       | YES     | NO      |
| 17  | 33      | 2 | 1 | 14                | 2             | YES                   | 20 + 5           | NO           | NO         | NO       | NO      | YES     |
| 18  | 28      | 1 | 0 | 7                 | 0.4           | NO                    | 24               | YES          | NO         | NO       | NO      | YES     |
| 19  | 29      | 2 | 1 | 9                 | 5             | YES                   | 20               | NO           | YES        | YES      | YES     | YES     |
| 20  | 30      | 1 | 0 | 16                | 0.5           | NO                    | 35               | NO           | YES        | NO       | NO      | YES     |
| 21  | 38      | 2 | 1 | 9                 | 3             | NO                    | 24               | YES          | YES        | YES      | YES     | YES     |

G, gravid; P, pregnancy; PROM, preterm rapture of membrane.

### Table 5: Comparison of endocervical polyps and decidual polyps in continuing pregnancy.

|                      | Endocervical polyp (n = 33) | Decidual polyp (n = 73) | p     |
|----------------------|-----------------------------|-------------------------|-------|
| Age (y)              | 30 (28, 33)                 | 31 (29, 34)             | 0.447 |
| G                    | 1 (1, 2)                    | 2 (1, 2)                | 0.117 |
| P                    | 0 (0, 1)                    | 0 (0, 1)                | 0.032 |
| Diameter of polyp    | 1 (00.75, 1.650)            | 2 (1.5, 3.0)            | <0.001|
| Discovery week (w)   | 17 (12.5, 22.5)             | 11 (8, 16)              | <0.001|
| Pregnancy outcomes   |                             |                         |       |
| Term birth           | 31 (93.9%)                  | 52 (71.2%)              |       |
| Adverse outcomes     | 2 (6.1%)                    | 21 (28.8%)              | 0.018 |
| Inflammation         |                             |                         |       |
| Negative             | 33 (100%)                   | 73 (100%)               | 1     |
| Positive             | 0                           | 0                       |       |
| Hemorrhage           |                             |                         |       |
| Negative             | 29 (87.9%)                  | 54 (74.0%)              |       |
| Positive             | 4 (12.1%)                   | 19 (26.0%)              | 0.108 |
| Thrombus             |                             |                         |       |
| Negative             | 30 (90.9%)                  | 67 (91.8%)              |       |
| Positive             | 3 (9.1%)                    | 6 (8.2%)                | 0.881 |
| Erosion              |                             |                         |       |
| Negative             | 5 (15.2%)                   | 2 (2.7%)                |       |
| Positive             | 28 (84.8%)                  | 71 (97.3%)              | 0.05  |
| Necrosis             |                             |                         |       |
| Negative             | 26 (78.8%)                  | 47 (64.4%)              |       |
| Positive             | 7 (21.2%)                   | 26 (35.6%)              | 0.138 |
| Decidual change      |                             |                         |       |
| Negative             | 29 (87.9%)                  | 0 (0%)                  | <0.001|
| Positive             | 4 (12.1%)                   | 100 (100%)              |       |
| Granulation hyperplasia |                        |                         |       |
| Negative             | 6 (18.2%)                   | 68 (93.2%)              | <0.001|
| Positive             | 27 (81.8%)                  | 5 (6.8%)                |       |
| Glandular hyperplasia |                      |                         |       |
| Negative             | 23 (69.7%)                  | 100 (100%)              | <0.001|
| Positive             | 10 (30.3%)                  | 0 (0%)                  |       |
Figure 4: Hematoxylin and eosin staining of an endocervical polyp during pregnancy shows the following: (a) granulation tissue proliferation (100×); (b) glandular proliferation (100×); (c) stroma with focal pseudo-decidual changes (200×); and (d) a focal gestational Arias-Stella reaction, where the gland underneath has a hypersecretory reaction, compared with the superficial endocervical mucinous epithelium (200×).

Table 6: Relationship between different pathological morphologies and adverse outcomes.

|                  | Adverse outcomes (n = 21) | Term birth (n = 52) | p   |
|------------------|---------------------------|---------------------|-----|
|                  | Negative                  | Positive            |     |
| Inflammation     | 0 (0%)                    | 21 (100%)           | 1   |
|                  | Negative                  | 16 (23.9%)          | 51 (76.1%) |
| Hemorrhage       | 6 (31.6%)                 | 13 (68.4%)          | 0.753|
|                  | Negative                  | 0 (0%)              | 2 (100%) |
|                  | Positive                  | 21 (29.6%)          | 50 (70.4%) |
| Erosion          | 13 (27.7%)                | 34 (72.3%)          | 0.779|
|                  | Negative                  | 8 (30.8%)           | 18 (69.2%) |
| Necrosis         | Positive                  |                     |     |
In the cases cited in this study, the initial pathologic impressions were erroneous or inaccurate, which caused a low diagnosis rate of decidual polyps. A total of 52 (52/250, 20.80%) cases were misdiagnosed as endocervical polyps with decidual change. The remaining cases were inaccurately diagnosed as decidua (92/250, 36.80%) and endometrial polyps with decidual change (106/250, 42.40%). However, these results contradict those of some reports. One paper indicated that the diagnostic rate was higher [6] and maintained that since the endocervical polyp with decidual change was difficult to distinguish, an endocervical polyp with decidual change had been categorized as a decidual polyp. The lack of concern and recognition with regard to decidual polyps may be attributed to the diagnostic problem. It is, thus, necessary to sort out the pathological manifestations of decidual polyps and facilitate a unified diagnosis to improve the diagnosis rate.

Currently, the decidual polyp is rarely reported in pathology books and articles, and, when it is, it is just described as the presence of expelled fragments of the decidua at the cervix [14], and there is no additional information. From the cases reviewed in this study, it can be inferred that the decidual polyp originates from the endometrium in the uterine body and breaks through the cervical canal to the cervix. A diagnosis of decidual polyps should be considered in cervical polypoid specimens when they (1) are taken from pregnant women; (2) have a flaky and pink surface, characterized by softness, fragility, and easy bleeding; (3) exhibit extensive decidual changes in the stromal cells; (4) demonstrate epithelium showing high progesterone reaction with high secretion or atrophic reaction; and (5) show no placental villus and trophocytes.

What follows are suggestions for the pathological diagnosis of cervical polyps during pregnancy: (1) the tissue origin should be clearly identified as endometrial or endocervical. Based on the findings of this study, the endometrial tissue is fragile and bleeds easily, whereas the cervical tissue is smooth and firm. Under the microscope, the endometrial tissue shows diffuse decidual reaction of stroma and epithelium, whereas the cervical tissue usually shows focal decidual reaction with more or less mucous epithelium and myofibrillar mesenchymal left. The granulation tissue and glandular proliferation are additional evidence for endocervical polyps. (2) For the endometrial origin, further examination of the placental villus and trophoblast components should be performed to exclude spontaneous abortion, and if none of the above mentioned components are present, a diagnosis of decidual polyps can be made. (3) Decidual polyps should be divided into two subtypes: type A, decidua fragment, and type B, decidua with endometrial polyp formation. (4) A description of the polyp should include the concomitant characteristics of endometrial polyps, namely, erosion, inflammation, necrosis, hemorrhage, and thrombi. In particular, attention should be paid to thrombi as the incidence of adverse pregnancy outcomes is higher in patients with thrombosis.

To the best of our knowledge, this is the largest study of decidual polyps, and this is the first study concerned with the pathological diagnosis of decidual polyps. It is not only the identification of decidual polyps that is important but also making an accurate pathological diagnosis. Several limitations must be considered with respect to this study. The samples were drawn from a single center, all the patients underwent a polypectomy, and there was no conservative treatment control group; therefore, the natural pathogenesis of the decidual polyp is not yet clear.

5. Conclusion

In summary, the decidual polyp is a common condition associated with adverse pregnancy outcomes. Despite this, it is often ignored, and universal recognition is limited. The findings of this study would suggest that a more uniform and accurate pathological diagnosis is necessary, and there should be more focus on the possibility of thrombosis and on the particular subtype due to the potential links with adverse pregnancy. The limitations of this study mean that further investigation into the pathogenesis of decidual polyp is required, along with an appropriate therapeutic schedule, to reduce the adverse pregnancy outcomes associated with this condition.

Data Availability

The authors declare that materials described in the manuscript, including all relevant raw data, will be freely available to researchers, without breaching participant confidentiality.

Ethical Approval

This study was conducted with approval from the Ethics Committee of the West China Second University Hospital of Sichuan University. This study was conducted in accordance with the Declaration of Helsinki.

Consent

All participants signed a document of informed consent.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors’ Contributions

Juan Zou and Shanling Liu conceived and designed the research. Huiling Chen and Juan Zou acquired the data. Juan Zou, Ying He, Xue Xiao, and Shanling Liu analyzed and interpreted the data. Peng Wang and Xue Xiao statistically analyzed the data. Juan Zou, Shanling Liu, and Xue Xiao helped with financing. Juan Zou and Peng Wang wrote the manuscript. Shanling Liu and Xue Xiao performed the critical revision of the manuscript for intellectual content.

Acknowledgments

The authors would like to acknowledge the hard and dedicated work of all the staff who implemented the intervention and evaluation components of the study and funding from
the Science and Technology Department of Sichuan Province, China (2021YFS0078), Cadre Health Care Committee of Sichuan Province, China (2019-1701), and the National Natural Science Foundation of China (No. 82071651).

References

[1] R. L. Haas, “The significance of decidual polyps in otherwise normal pregnancies,” *American Journal of Obstetrics and Gynecology*, vol. 54, no. 1, pp. 124–126, 1947.

[2] S. Aoki, M. Hayashi, K. Seki, and F. Hirahara, “Preterm premature rupture of membrane after polypectomy using an Endoloop polydioxanone suture II,” *Clinical case reports*, vol. 4, no. 4, pp. 331-332, 2016.

[3] N. Seo, D. Tachibana, T. Misugi, M. Koyama, and S. Tanaka, “First trimester findings of decidual polyp: caution to avoid polypectomy,” *European Journal of Obstetrics & Gynecology and Reproductive Biology*, vol. 249, pp. 109-110, 2020.

[4] G. H. Hilbert and F. C. Coleman, “Decidual polyps of the cervix,” *American Journal of Obstetrics and Gynecology*, vol. 61, no. 4, pp. 919–922, 1951.

[5] G. Levin and A. Rottenstreich, “2nd trimester miscarriage following decidual polypectomy,” *European Journal of Obstetrics & Gynecology and Reproductive Biology*, vol. 225, pp. 262-263, 2018.

[6] M. Tokunaka, J. Hasegawa, T. Oba et al., “Decidual polyps are associated with preterm delivery in cases of attempted uterine cervical polypectomy during the first and second trimester,” *Journal of Maternal-Fetal and Neonatal Medicine*, vol. 28, no. 9, pp. 1061–1063, 2015.

[7] K. Fukuta, S. Yoneda, N. Yoneda et al., “Risk factors for spontaneus miscarriage above 12 weeks or premature delivery in patients undergoing cervical polypectomy during pregnancy,” *BMC Pregnancy and Childbirth*, vol. 20, no. 1, p. 27, 2020.

[8] D. H. Guo, “Analysis of 17 cases of decidual prolapse in early pregnancy,” *Shi Yong Fu Ke Yu Chan Ke Zhi*, vol. 6, p. 101, 1990.

[9] Y. X. Wang, “Misdiagnosis of decidual prolapse in early pregnancy: an analysis of 11 cases,” *Zhong Guo Ji Hua Sheng Yu Xue Za Zhi*, vol. 10, p. 629, 2003.

[10] Y. J. Zhang and F. Zhang, “Analysis of pregnancy outcome after cervical polypectomy during pregnancy,” *Zhong Guo Sheng Yu Jian Kang Za Zhi*, vol. 29, no. 2, pp. 138–141, 2018.

[11] J. Zhang, X. H. Chang, and S. L. Zhang, “Colposcopic diagnosis and conservative treatment of 14 cases of pregnancy with decidual prolapse,” *Chinese Journal of Clinical Obstetrics and Gynecology*, vol. 17, no. 5, pp. 452-453, 2016.

[12] O. Gangemi, M. Petrone, and F. Crivelli, “Spontaneous expulsion of decidualized pseudopolyps in pregnant women with uterine malformation,” *Clinical & Experimental Obstetrics & Gynecology*, vol. 14, no. 2, pp. 113–115, 1987.

[13] V. Tanos, K. E. Berry, J. Seikkula et al., “The management of polyps in female reproductive organs,” *International Journal of Surgery*, vol. 43, pp. 7–16, 2017.

[14] J. Robert, H. E. Lora, and M. R. Brigitte: Benign Diseases of the Cervix. Blaustein’s Pathology of the Female Genital Tract. 7th ed. 2019.