Primary diffuse large B-cell lymphoma of uterine cervix diagnosed by cytology and concurrent cervical biopsy: a case report and literatures reviews since 1980

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Malignant lymphoma of the uterine cervix is rare with non-specific clinical presentation and is difficult to diagnose via cervical cytology. The current study presents a case of primary malignant lymphoma of the uterine cervix diagnosed via initial conventional smear cytology and subsequent cervical biopsy. We present a case of an 81-year-old woman with vaginal bleeding post-urination. The conventional smear cytology showed scattered large atypical lymphoid cells with necrotic debris. The concurrently biopsied specimen revealed large monotonous atypical lymphoid cells, which were immunoreactive for CD20 with high Ki-67 proliferative index, consistent with diffuse large B-cell lymphoma (DLBCL). Due to the transfer of the patient to another hospital, any other examinations associated with staging were not performed. Although rare, the likelihood of malignant lymphoma should be considered while screening for cervical cancer through cytology using Pap smear or conventional smear. Cytological screening may be useful for the early diagnosis of malignant lymphoma of the uterine cervix. Immediate and appropriate treatment can be initiated with a quick and accurate diagnosis. Herein, we report a case of primary uterine cervical DLBCL and review the literatures comprising 106 cases studies with 255 cases of primary cervical lymphoma reported since 1980 including clinical and histological characteristics through MEDLINE database.

Keywords
Uterine cervix; Lymphoma; Chemotherapy; Primary; B-cell

1. Introduction
Primary lymphoma of the uterine cervix (PLUCX) and corpus accounts for only 0.5% of extra-nodal malignant lymphomas, and among all cervical malignancies, the overall incidence of PLUCX is less than 1% [1]. Lymphomas of the female genital tract may be a primary manifestation of this area or may occur as genital recurrences or metastases that were initially diagnosed elsewhere. Kosari et al. [2] defined PLUCX as lymphomas localized in the uterine cervix without any myometrial involvement and without any evidence of leukemia at the time of diagnosis. When the uterine cervix is affected secondarily by malignant lymphoma in the setting of a systemic disease or when the biopsy specimen is encountered, the diagnosis is usually not difficult. However, when the uterine cervix is a primary site based on the clinical presentation or when the lesion is encountered on a cytological specimen (Pap smear or a conventional smear slide), diagnosis may be difficult. Herein, we report a case of diffuse large B-cell lymphoma (DLBCL) arising in uterine cervix which was diagnosed initially via cytology and confirmed by concurrently biopsied specimen. In addition, we review the 106 articles containing 255 cases of PLUCX available on PUBMED since 1980 and discuss the current knowledge on diagnosis, management, and of PLUCX. The study was approved by the ethics committee of Chosun university hospital (Institutional Review Board of Chosun university hospital, Gwangju, Korea), who waived the requirement for written informed consent due to the nature of the study.

2. Case presentation
An 81-year-old female patient with a history of hypertension and hyperlipidemia presented with vaginal bleeding for 3 months. Tele-cervicography revealed whitish hemorrhagic mass lesion with ulcerative surface occupying the uterine cervix (Fig. 1A). Pelvic ultrasound scan showed an irregular round hypoechoic mass approximately 7.0 cm in diameter. The abdominal computerized tomography scan showed a uterine mass of 6.7 cm size with intermediate to high signal intensity in T2-weighted image abutting upper to mid rectum suggesting rectal invasion. Moreover, pelvic magnetic resonance imaging scan revealed a heterogeneous enhancing mass, suggesting rectal invasion; however, there was no evidence of pelvic metastasis or uterine body involve ment (Fig. 1B, arrow). Cervical cytological examination using conventional smear was performed. The slide revealed a necrotic background and scattered atypical cell clusters and single cells with “small round blue cells” with a high nuclear/cytoplasmic (N/C) ratio, scant cytoplasm, and hyperchromatism (Fig. 2A). Since there was no epithelial component detected, the lesion was suspected to be a nonepithelial malignant tumor, including malignant lymphoma, via cervical cytology. It was classified as “other malignancy” according to the Bethesda System 2001. A punch biopsy of the
Fig. 1. Telecervicography showed whitish hemorrhagic mass lesion with ulcerative surface occupying the uterine cervix (A). Pelvic MRI revealed heterogeneous enhancing mass, suggesting rectal invasion (B, arrow).

Fig. 2. Cytological examination using conventional smear demonstrated a necrotic background and scattered atypical cell clusters and single cells showing 'small round blue cells (A, × 20). The cervical specimen filled with diffuse large and atypical lymphocytes with remnant endocervical glands (B, × 20). Immunohistochemically, the atypical cells were immunoreactive for CD20 (C, × 20) while CD3 (D, × 20) were negative.
uterine cervix was carried out concurrently, and the histological examination revealed diffuse large atypical lymphocytes with remnant endocervical glands (arrow) (Fig. 2B). Immunohistochemically, the atypical cells tested negative for epithelial marker, cytokeratin (CK). Most cells were strongly immunoreactive for CD45 (LCA) and CD20 (Fig. 2C) while only scattered, small T-cells were positive for CD3 (Fig. 2D), and staining was diffusely negative. On the basis of histologic and immunohistochemical findings, we diagnosed it as primary cervical DLBCL. The patient was discharged without any treatment in our hospital and lost to follow-up.

3. Discussion

Malignant lymphomas can also affect extra-nodal sites, approximately in one-third of the cases [3]; the most common sites are the gastrointestinal tract and skin [3]. In rare cases, it may affect the female reproductive organs, with the ovaries being the most common site [3], PLUCX is an extremely rare occurrence. As per MEDLINE, since the 1980s, about 250 cases of PLUCX have been reported. We reviewed 106 articles on PLUCX available on PUBMED since 1980 (search term: “uterine cervix”, “lymphoma”) (Table 1). The previous reports on cervical involvements in the systemic lymphomatous or leukemic conditions were excluded. Table 1 summarizes the characteristics and findings of these 106 cases with comprising 255 cases. In our literature review, the mean age of the patients was 51 years, and the most common clinical symptoms were vaginal bleeding including hypermenorrhea, menorrhagia, postcoital bleeding, atypical uterine bleeding, and dysfunctional uterine bleeding. Other symptoms included vaginal spotting, vaginal discharge, abdominal pain, pelvic pain, menolipsis, micturition pain, lower back pain, dyspareunia, hydronephrosis, and other urinary symptoms. Out of 168 cases, the most common histologic types were identified. The most common histologic type was DLBCL (53.6%, n = 90/168), followed by follicular lymphoma (18.3%, n = 4/168), unclassified B-cell lymphoma (7.3%, n = 13/168) and unclassified non-Hodgkin lymphoma. Rarely, mucosa-associated lymphoid tissue lymphoma, marginal zone lymphoma, peripheral T-cell lymphoma, NK/T-cell lymphoma, Burkitt lymphoma, small lymphocytic lymphoma were also reported. In the literatures of 1980’s and 1990’s, by classification by “Working formulation”, diffuse pattern of lymphoma was common (14.2%, 24/168 cases).

Of the 106 case studies analyzed in this review, treatment protocols were identified for 156 patients from 84 papers. No standardized therapy modality was found. Various treatments and treatment combinations were used. Surgery such as total abdominal hysterectomy (TAH) and bilateral oophorectomy (BOSO), TAH, or radical hysterectomy (RH), radiotherapy (RTx), and various combination of chemotherapy (CTx) as well as combinations of these treatment modalities have been used. Of the 156 patients, 44 (28.2%) underwent hysterectomy with or without CTx or RTx. Additionally, most of the patients received CTx; Of the 156 patients, (96/156) underwent CTx, either alone or in combination with surgery or RTx. Combination CTx including cyclophosphamide, doxorubicin, vincristine with or without rituximab, is the most common treatment for patients with PLUCX. Hilal et al. [107] suggested that a specialized pathological assessment may be required for planning the treatment for PLUCX. They proposed that local surgery followed by a comprehensive staging is the most reasonable therapy for women with early stage PLUCX both for diagnostic and therapeutic reasons. In case of localized disease, there is no evidence for an adjuvant treatment; therefore, adjuvant RTx, CTx or targeted therapies cannot be recommended outside of clinical trials [106].

Despite the wide variation in treatments carried out for patients with PLUCX in the previous studies, the prognosis of this disease was favorable. In the pooled analysis of our literature review, individual follow up data of 117 patients (70 studies) were reported, out of which 109 patients (93.2%) achieved complete remission or disease-free state. Moreover, several cases of successful pregnancy and delivery after treatment of PLUCX have been reported [39, 55, 95]. Based on these post-treatment outcomes, we concluded that PLUCX has an excellent prognosis despite the lack of a standard treatment, therapeutic uncertainty, and a resulting variability of applied treatments. Hilal et al. [107] reviewed 246 cases of primary and recurrent cervical lymphomas and reported that most cases are occurring at an early stage, had the histological appearance of a DLBCL, and a good 5-year overall survival rate of > 80%. This is consistent with the 5-year survival rate of 73% reported by Harris et al. [106] in a case series including 21 women with lymphoma of uterine cervix and with the 5-year survival rate of 86% reported by Ahmad et al. [30] in their case series including 9 women.

In cervical cytology, the detection rate for malignant lymphoma cells has been reported to be 30%–40% [9]. Some researchers described that unlike epithelial tumor, lymphomas arise from the stroma, and that cervical cytology is not sensitive enough to recognize them [3]. However, in our case, the classical cervical cytological features of a malignant lymphoma from the conventional smear were so prominent; that we were able to detect the malignant lymphoma at an early stage from the cervical cytology. As per Cahill et al. [108], in cervical cytology, the classical features of lymphoma cells are as follows: a dispersed monomorphic cell population, high N/C ratios, coarse granular nuclear chromatin, focally cleaved nuclei, and the presence of prominent nucleoli. Based on the morphological access, the important differential diagnosis includes chronic cervicitis with lymphoid hyperplasia, malignant melanoma, carcinosarcoma, small cell carcinoma, and so on. Usually, immunohistochemistry can effectively differentiate these tumors from cervical lymphoma. Also, subtype of lymphoma can be determined based on the morphology and immunohistochemical profiles.
| Ref. No. | Author            | Journal                  | Year | No | age | Sx. | histology | Tx.          | Px.   |
|---------|-------------------|--------------------------|------|----|-----|-----|-----------|--------------|-------|
| 1       | Calli et al.      | J Cytol                  | 2012 | 1  | 65  |     |           |              |       |
| 2       | Singh et al.      | J Obstet Gynaecol India  | 2016 | 2  | 56 (m) | AP (2) | DLBCL (2) | RTx + R-CHOP | NED (2) |
| 3       | Bi et al.         | Asia J Obstet Gynaecol   | 2016 | 1  | 49  |     |           |              |       |
| 4       | Muhammed et al.   | Cureu                    | 2020 | 1  | 51  | VS  | CHL      | CTx          | Recur  |
| 5       | Mathilde et al.   | Gynecol Oncol Rep        | 2020 | 1  | 36  | 1)  | DLBCL    | R-CHOP      | NED   |
| 6       | Gui et al.        | Oncol Lett               | 2019 | 3  | 48 (m) | VB   | DLBCL (2) | R-CHOP      | CR (3) |
| 7       | Roberts et al.    | Gynecol Oncol Rep        | 2018 | 1  | 55  | VB  | DLBCL    | R-CHOP →LAVH, BSO | CR     |
| 8       | Koyanagi et al.   | Oncol Lett               | 2018 | 1  | 69  | R-E | DLBCL    | R-CHOP      | CR     |
| 9       | Yang et al.       | Diag Cytopathol          | 2017 | 1  | 71  | VB  | MZL      | R-CHOP      | CR     |
| 10      | Takimoto et al.   | Rinsho Ketsuiki          | 2017 | 1  | 37  | aSx | DLBCL    | 4)          | CR     |
| 11      | Kosari et al.     | Int J Gynecol Pathol     | 2017 | 1  | 49  | VB  | PTCL     | CHOP + RTx  | DOD    |
| 12      | Kubo et al.       | Medicine (Baltimore)      | 2017 | 1  | 51  | VB  | DLBCL    | R-CHOP      | NED   |
| 13      | Zhuo et al.       | Clin Nucl Med            | 2016 | 1  | 31  | menolipsis | DLBCL | R-CHOP      | NED   |
| 14      | Yang et al.       | Diag Cytopathol          | 2016 | 1  | 40  | pain | DLBCL    | R-CHOP      | NED   |
| 15      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| 16      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| 17      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| 18      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| 19      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| 20      | Ahmad et al.      | Int J Gynecol Cancer     | 2014 | 1  | 49  | VB  | DLBCL    | CHOP, RTx   | CR     |
| Ref. No. | Author              | Journal                      | Year | No age | Sx.          | histology          | Tx.          | Px.          |
|---------|---------------------|------------------------------|------|--------|--------------|-------------------|--------------|--------------|
| 34      | Yalta et al.        | J Cytol                      | 2012 | 1      | 56           | BCL               | TAH USO PL   | -            |
| 35      | Vasudev et al.      | Online J Health Allied Sci   | 2012 | 1      | 52           | VB                | DLBCL        | TAH BSO     | CR           |
| 36      | Parnis et al.       | Case Rep Hematol            | 2013 | 1      | 54           | VB                | DLBCL        | R-CHOP + RTx| NED          |
| 37      | Daniel et al.       | Radiologia Brasileira       | 2012 | 1      | 80           | LBP               | DLBCL        | CTx          | -            |
| 38      | Binesh et al.       | BMJ Case Rep                | 2012 | 1      | 85           | VB                | DLBCL        | R-CHOP       | DOOD         |
| 39      | Upanal et al.       | Aust N Z J Obstet Gynaecol  | 2011 | 2      | 50 (m)      | DLBCL (2)         | R-CHOP (2)   | CR (2)       |
| 40      | Parva et al.        | J Obstet Gynaecol Can       | 2011 | 1      | 21           | DUB               | DLBCL        | CHOP         | NED          |
| 41      | Dyer et al.         | Br J Haematol               | 2012 | 2      | 25 (m)      | R-E/VB            | DLBCL (2)    | CHOP, R-CHOP| CR (2)       |
| 42      | Ustaalioglu et al.  | Leuk Res                    | 2010 | 1      | 65           | VB                | DLBCL        | R-CHOP + RTx| CR           |
| 43      | Naki et al.         | Turk J Haematol             | 2010 | 1      | 82           | VB                | DLBCL        | TAH BSO→R-CHOP| NED          |
| 44      | Bajal et al.        | J Can Res Ther              | 2009 | 1      | 44           | VB                | DLBCL        | R-CHOP + RTx| CR           |
| 45      | Amna et al.         | BMJ Case Rep                | 2009 | 1      | 46           | VB                | DLBCL        | RCVP + RTx   | NED          |
| 46      | Okudaira et al.     | Gan To Kagaku Ryoho         | 2008 | 1      | 68           | VB                | FL           | CHOP         | NED          |
| 47      | Köhler et al.       | Rev Bras Ginecol Obstet     | 2008 | 2      | 44 (m)      | aSx/VD            | NHL-B (2)    | CHOP + RTx (2)| NED (2)     |
| 48      | Hanprasertpong et al.| Asian Pac J Cancer          | 2008 | 1      | 25           | VB, VD            | DLBCL        | CHOP         | CR           |
| 49      | Coon et al.         | J Clin Oncol                | 2008 | 1      | 56           | VS                | MALT         | TAH BSO→RTx + R| NED          |
| 50      | Ab Hamid et al.     | Singapore Med J             | 2008 | 1      | 43           | VB                | DLBCL        | CHOP         | NED          |
| 51      | Signorelli et al.   | Gynecol Oncol               | 2007 | 10     | 47 (m)      | DBCL (10)        | CHOP (5)/CVP + CHOP/TAHBSO NED (10) (3) |
| 52      | Lu et al.           | Zhonghua Bing Li Xue Za Zhi | 2007 | 16     | 58           | -                 | DLBCL (12)   | -            |
| 53      | Lorusso et al.      | Oncology                     | 2007 | 1      | 29           | -                 | NHLL         | CTx→Surgery | NED          |
| 54      | Korcum et al.       | Ann Hematol                 | 2007 | 1      | 67           | VB                | FL           | CHOP, RTx   | NED          |
| 55      | Jiang et al.        | Zhonghua Fu Chan Ke Za Zhi  | 2007 | 10     | -            | -                 | -            | -            |
| 56      | Semczuk et al.      | Pathol Res Pract            | 2006 | 1      | 43           | R-E               | DLBCL        | CHOP         | CR           |
| 57      | Gonzalez-Cejudo et al.| Eur J Obstet Gynecol Reprod Biol | 2006 | 1      | 26           | VB                | DLBCL        | TAH          |              |
| 58      | Frey et al.         | Leuk Lymphoma               | 2006 | 1      | 46 (m)      | VB                | DLBCL (3)    | CTx→TAH(1)/TAH→CTx(2)/TAH (MZL)| NED (4)     |
| 59      | Cantu DL et al.     | Int J Gynaecol Cancer       | 2006 | 1      | 56           | -                 | DLBCL        | CTx + RTx   |              |
| 60      | Van Renterghem et al.| Eur J Gynaecol Oncol        | 2005 | 2      | -            | VB                | DLBCL        | NED          |              |
| 61      | Murad et al.        | J Coll Phys Surg Pak        | 2005 | 1      | 62           | VB                | NHL          | -            |              |
| 62      | Kosari et al.       | Am J Surg Pathol            | 2005 | 16     | -            | DLBCL (11)       | FL (4)       |              |
| Ref. No. | Author          | Journal                  | Year | No age | Sx. histology | Tx. | Px.          |
|----------|-----------------|--------------------------|------|--------|---------------|-----|--------------|
| [62]     | Huang et al.    | Pathol Res Pract         | 2005 | 42     | Burkitt L     | surgery | DOD         |
| [63]     | Goker et al.    | Int J Gynecol Cancer     | 2005 | -      | BL            | CTx  | -            |
| [64]     | Garavaglia et al.| Gynecol Oncol            | 2005 | 37     | DLBCL (3)     | MACOP-B (2) | NED (3)   |
| [65]     | Durus et al.    | Gynecol Oncol            | 2005 | 50 (m) | VD/R-E        | TAHBSO→CHOP | NED (2)   |
| [66]     | Thyagarajan et al.| Br J Radiol              | 2004 | 41     | VB            | H/G BCL | CR          |
| [67]     | Mikami et al.   | Gynecol Oncol            | 2004 | 52     | VB            | CLL/SLL | DOD         |
| [68]     | Szanto et al.   | Gynecol Oncol            | 2004 | 36     | DLBCL (3)     | CHOP→RH BSO | NED       |
| [69]     | Kahlia et al.   | Int J Gynecol Pathol     | 2004 | 32     | VB            | DLBCL  | CR          |
| [70]     | Hu et al.       | Zhonghua Zhong Liu Za Zhi| 2003 | 57 (m) | VB, AP, aSx, R-E, AUB | DOD(2) |             |
| [71]     | Au et al.       | Am J Hematol             | 2003 | 45     | VB            | MALTL  | NED         |
| [72]     | Rossi et al.    | Mod Pathol               | 2000 | 57 (m) | VB, AP, aSx, R-E, AUB | MZL, FL | Cone+CTx+CTx+RTx |
| [73]     | Liro et al.     | Arch Pathol Lab Med      | 2000 | 64     | VB            | TCL    | RTx         |
| [74]     | Pomares et al.  | Pathol Res Pract         | 2000 | 1      | VB            | DLBCL  | TAH BSO     |
| [75]     | Kostopoulos et al.| An Med Interna           | 2000 | 64     | VB            | (m)    | TCL         |
| [76]     | Wang et al.     | J Reprod Med             | 1999 | 35     | aSx           | L/G BCL | RH          |
| [77]     | Grace et al.    | Eur J Gynaecol Oncol     | 1999 | 44 (m) | aSx           | FL/DLBCL | CHOP + RTx  |
| [78]     | Nasu et al.     | J Obstet Gynaecol Res    | 1998 | 64     | VB            | DLBCL  | CTx (THP-COP) | CR       |
| [79]     | Lee et al.      | Austral Radiol           | 1998 | 66 (m) | VB (2)        | NHL (2) | RH→RTx/RH→RTx | CR/NED  |
| [80]     | Kaito et al.    | J Obstet Gynaecol Res    | 1998 | 80     | VB            | DLBCL  | CHOP + RTx  |
| [81]     | Chandy et al.   | J Obstet Gynaecol Res    | 1998 | 59     | VB            | VLHL   | CHOP RTx    | NED      |
| [82]     | Biswal et al.   | J Indian Med Assoc       | 1997 | 2      | VB            | -      | -            |
| [83]     | Dhimes et al.   | Cytopathology            | 1996 | 69     | aSx           | DLBCL  | TH           |
| [84]     | Al-Talib et al. | Cytopathology            | 1996 | 25     | VB            | H/G BCL | CTx         |
| [85]     | Abbas et al.    | Am J Roentgenol          | 1996 | 25     | VB            | PLL    | embolization→CTx→mass removal | NED       |
| [86]     | Winer et al.    | J Gynecol Obstet Biol Reprod (Paris) | 1995 | 78     | DLBCL (7)     | CBL    | TH→CTx+RTx  |
| [74]     | Vang et al.     | Mod Pathol               | 2000 | 57 (m) | VB, AP, aSx, R-E, AUB | DOD(2) | Cone+CTx+CTx+RTx |
| [75]     | Pomares et al.  | An Med Interna           | 2000 | 1      | TCL           | RTx    |             |
| [76]     | Kostopoulos et al.| Pathol Res Pract         | 2000 | 64     | VB            | DLBCL  | TAH BSO     |

**Table 1. Continued.**
| Ref. No. | Author       | Journal                          | Year | No age | Sx.  | histology | Tx.                      | Px.          |
|----------|--------------|----------------------------------|------|--------|------|-----------|--------------------------|--------------|
| [88]     | Reynaud et al. | J Gynecol Obstet Biol Reprod (Paris) | 1995 | 1      | -    | -         | -                        | -            |
| [89]     | Makarewicz et al. | Clin Oncol | 1995 | 3      |       | NHL       | -                        | -            |
| [90]     | Figuera et al.  | Sangre (Barc) | 1994 | 1      |       | -         | -                        | -            |
| [91]     | Rodier et al.   | J Chir (Paris) | 1993 | 1      |       | NHL       | -                        | -            |
| [92]     | Maryniak et al. | Eur J Gynaecol Oncol | 1993 | 3      |       | BCL       | -                        | -            |
| [93]     | Aozasa et al.   | Cancer | 1993 | 4 53(m) | VB   | DL/DLNC   | CTx + RTx/TH + RTx       | DOD (3)  |
| [94]     | Bou Saba et al. | J Med Liban | 1992 | 1 45   | R-E   | DLC/DMix  | TH SO + RTx/TH + RTx     | DOOD        |
| [95]     | Pasini et al.   | Eur J Gynaecol Oncol | 1991 | 1      |       | VB        | NHL-B                   | TAHSBO-CHOP  |
| [96]     | Muntz et al.    | Cancer | 1991 | 5 51(m) | VB   | DL (3)/FS | RTx (3)/TAHSBO +RTx/TH + TAHSBO &LND | NED (5)  |
| [97]     | Sandvei et al.  | Gynecol Oncol | 1990 | 1 22   | VB VS | VB VS    | VL VS                  | NED         |
| [98]     | Ohba et al.     | Gynecol Oncol | 1990 | 3      |       | VB VS    | VL VS                  | NED         |
| [99]     | Murutsuki et al. | Gan No Rinsho | 1989 | 1 85   | VB    | DS       | TAH                     | CR          |
| [100]    | Khoury et al.   | Eur J Surg Oncol | 1989 | 2      | -     | -         | -                       | RTx + CTx   |
| [101]    | Cardillo et al. | Eur J Gynaecol Oncol | 1987 | 1      | -     | PLL       | -                       | -          |
| [102]    | Cardillo et al. | Eur J Gynaecol Oncol | 1987 | 1      | -     | PL        | -                       | -          |
| [103]    | Taki et al.     | Acta Cytol | 1985 | 1      |       | -         | -                       | BCL         |
| [104]    | Gharpure et al. | Indian J Cancer | 1985 | 2      | -     | AP/PD     | DL (2)                  | Recur       |
| [105]    | Komaki et al.   | Cancer | 1984 | 3 40(m) | AP/PD | DL (2)    | RTx (3)                 | Recur       |
| [106]    | Harris et al.   | Cancer | 1984 | 20 42(m) | AP/PD | DL (2)    | RTx (3)                 | Recur       |

(1) hydronephrosis, (2) irritative urinary voiding, (3) urinary incontinence and menometrorrhagia, Men, menorrhagia; P/D, pelvic discomfort; A/P, abdominal pain; VB, vaginal bleeding; VS, vaginal spotting; VD, vaginal discharge; R-E, routine exam; LBP, lower back pain; aSx, asymptomatic; AUB, abnormal uterine bleeding; DUB, dysfunctional uterine bleeding; CTx, chemotherapy; RTx, radiotherapy; CHOP, combination chemotherapy including cyclophosphamide; doxorubicin; vincristine; prednisone R, rituximab; (4) Chlamydia trachomatis eradication; CR, complete response; NED, no evidence of disease; DOD, dead of disease; DOOD, dead of other disease; Mc, myomectomy; RS, radical hysterectomy and bilateral salpingo-oophorectomy; PL, pelvic lymphadenectomy; DLBCL, diffuse large B-cell lymphoma; FL, follicular lymphoma; MZL, Marginal zone lymphoma; MALTL, MALT lymphoma; NHL, Non-Hodgkin lymphoma; BCL, B-cell lymphoma; PLL, Plasmacytoid lymphoma; CBL, centroblastic lymphoma; DL, diffuse large; FSC, follicular small cleaved; FC, follicular cleaved; IBL, immunoblastic lymphoma; D&S L, diffuse and small lymphoma; DM, diffuse mixed; DIB, diffuse immunoblastic.
Accurate diagnosis for malignant lymphoma is important to prevent inappropriate gynecological surgeries such as RH and BSO. The clinical diagnosis of cervical lymphoma may be difficult because of the lack of specific symptoms. The most common clinical symptoms have been reported to be vaginal bleeding followed by vaginal discharge, abdominal or pelvic pain, among other symptoms. However, some patients were found to be asymptomatic, which were also identified in the present review. Consequently, the correct diagnosis is often delayed or the condition is misdiagnosed as a solid tumor in the cervix, which results in the disease diagnosed at an advanced stage or that the tumor is initially treated by wide surgical resection followed by CTx with or without RTx.

Since most cervical lymphomas are located sub-epithelially, unless ulceration is observed, the cervical cytology can be negative. However, cytological test screening may be useful for the early diagnosis of PLUCX. Although rare, the likelihood of malignant lymphoma should be considered while screening for cervical cancer using Pap smear or conventional smears for immediate and accurate diagnosis, and as a result, radical surgery may be avoided.

4. Conclusions
In conclusion, we presented a case of an 82-year-old woman with a primary DLBCL of the uterine cervix, which was initially diagnosed via conventional smear cytology and confirmed via concurrently biopsied surgical specimen. Moreover, we reviewed 106 articles with 255 cases and discussed the clinical and histological characteristics, treatment strategies, and survival outcomes in patients with PLUCX. Accurate and timely diagnosis through cytology and early biopsy can lead to immediate treatment without the need for surgeries such as RH and BSO. Despite its rarity, the differential diagnosis of malignant lymphoma should be included when screening for cervical cancers using cervical cytology.

Author contributions
RH designed and supervised the study. SAK and TKA collected and organized datm and wrote and revised the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate
The study was approved by the ethics committee of Chosun University Hospital (Institutional review Board of Chosun university hospital, Gwangju, Korea), who waived the requirement for written informed consent due to the nature of the study.

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Conflict of interest
The authors declare no conflict of interest.

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