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Unexpected encounters challenging modified radical hysterectomy

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Abstract
Objective: The intention of this study is to educate and caution young surgeons about the possibility of stumbling into anatomical anomaly while operating for cancer cervix.
Methods: This is an observational study, reflecting the numbers of congenital anomalies that were encountered while doing hysterectomy for cancer cervix in a tertiary care hospital within a 16 years span.
Results: This study revealed the overall prevalence of congenital anomalies while performing hysterectomy for cancer cervix to be 2.9% and double ureter to be most common anomaly encounterd.
Conclusion: Anatomical anomalies pose challenges when encountered while operating for cancer cervix. Surgical methods and dissections need to be planned accordingly to protect urinary pathways and vessels, that should be kept in mind particularly by low volume surgeons. Surgery can be disastrous if they is not recognized prior to procedure.

Keywords: carcinoma cervix; radical hysterectomy; congenital anomalies; pelvic kidney; double ureter

Introduction
Congenital anomalies are not uncommon. About 2% newborn infants will have major anomalies. The incidence may be as high as 5% if one includes anomalies detected later in childhood such as abnormalities of heart, kidney, lungs and spine [1]. The incidence of malformations involving genitourinary systems is one of the highest (10%) of all body systems [2]. Their etiological significance is uncertain but additional technical difficulty in treatment is definite.
Cancer cervix is an entity which needs multimodality treatment at various levels.
Associated anomalies will be an important factor in planning management as the treatment modality may be associated with risk of inducing pathological changes in the anatomical structure that is anomalously situated in treatment field [3]. Surgery will be disastrous if anatomical anomaly is not recognized prior to procedure. Radiotherapy will pose radiation induced changes in all the organs anomalously situated in the field.

Aims and Objective
To study the incidence of anomalies encountered while treating cancer cervix in Govt. Royapettah cancer hospital in a span of 16 years and it's significance in managing cancer.

Materials and Methods
It is an observational study. The hospital records of all patients of cancer cervix between the years of 2002 to 2018 were studied. Later cases in study period that were operated were seggreagated separately. All those records of cancer cervix who have been operated were studied for any congenital anomalies that were encountered while operating or evaluating.

Observations/ Results
A total of five hundred and fortyseven (547) cases of cancer cervix were operated within the span of 2002 to 2018. Out of them sixteen patients had congenital anomalies. The most common congenital anomaly that was encountered was duplication of ureter (7 pts.). The next common anomaly that was encountered was pelvic kidney (5 pts.). Other anomalies were persistent urachus (2 pts.), anomalies of external iliac vein (1 pt.) and horseshoe kidney (1 pt.).

Table 1: Show the anomaly, frequency and incidence (%)

S. No	Anomaly	Frequency	Incidence (%)
1	Duplication of ureter	7	1.27
2	Pelvic kidney	5	0.91
3	Urachus	2	0.36
4	Duplicated external iliac vein	1	0.18
5	Horseshoe kidney	1	0.18

Out of the seven patients of ureteric duplication two were partial duplication. The patients with pelvic kidney had the unascended kidney in pelvis with four on left and one patient on right side. All of them derived their arterial supply from corresponding common iliac artery and drained into corresponding common iliac vein. The patients with patent urachus were asymptomatic and the urachus was extending up to varying lengths from 2-3 cms from bladder. The one with anomaly of iliac vein had a bifid right external iliac vein.

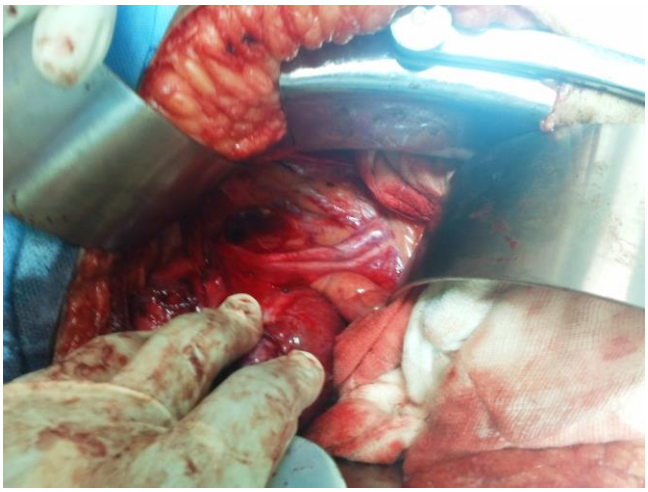

Fig 1: Double ureter

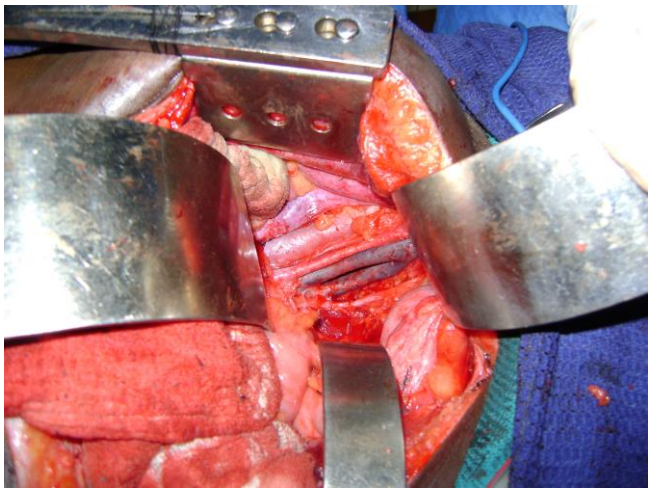

Fig 2: Bifid right external iliac vein

Discussion

In view of the complexity and duration of differentiation and development of the genital and urinary systems, it is not surprising that the incidence of malformations involving these systems is one of the highest (10%) of all body systems [2]. Etiologies of congenital malformations are sometimes categorized on the basis of genetic, environmental, or genetic-plus-environmental (so-called polyfactorial inheritance) factors. Known genetic and inheritance factors reputedly account for about 20% of anomalies detected at birth, aberration of chromosomes for nearly 5%, and environmental factors for nearly 10%. Even so, congenital malformations remain a matter of concern because they are detected in nearly 2-5% of infants, and 20% of perinatal deaths are purportedly due to congenital anomalies [1].

In the present study, an attempt has been made to find out the total and individual incidence of anomalies during hysterectomy for cancer cervix. The overall incidence of congenital anomalies encountered during hysterectomy was 2.74%. The most common anomaly encountered was duplication of ureter (1.27%) followed by pelvic ureter (0.73%). More than half of the anomalies were related to genitourinary system followed by vascular anomalies.

The incidence of ureteral duplication is 1 of 2000 people in autopsy series [4]. Ureteral duplication occurs when a single ureteral bud branches prematurely during ascent or when two distinct ureteral buds arise from the wolffian duct. They are more commonly associated with benign complications like stone disease [5]. Consequently, benign causes of pain may be managed mistakenly aggressively in view of malignant process.

Pelvic kidney is the most common type of renal ectopia [6]. however in this study it is second to ureteral duplication. The incidence is about 1 in 2100-3000 and occurs due to failure of kidney to ascend [7]. There is no etiological association between carcinoma cervix and pelvic kidney but they pose therapeutic dilemma during management [8]. Rajaraman Ramamurthy et.al recommended surgery in early stages of carcinoma cervix with pelvic kidney to avoid radiation induced damage to pelvic kidney [3].

During early embryologic development, the urinary bladder is continuous with the allantois, a canalized fibromuscular stalk that connects the fetal bladder to the umbilical cord for drainage. The urachal canal normally obliterates as the bladder descends into the fetal pelvis, forming a fibrous connection with the ventral abdominal wall known as the median umbilical ligament. Complete obliteration typically occurs during late fetal development or early infancy (<6 months) [9]. Most of the patients with this anomaly are asymptomatic, however the common complications as per literature are patent urachus, sinus, cyst and diverticulum. In this study, this anomaly was encountered as small asymptomatic diverticulum thereby not significantly altering any management.

Congenital variations in iliac venous anomaly have been paid scant attention in literature. Reduplication of iliac veins was stated by Edwards [10]. To be quite common. Pelvic lymphadenectomy should be done meticulously without injuring the anomaly, however any injury to the vein has a salvageable option in such cases. Horseshoe kidney (HSK) is the most common abnormality renal fusion anomaly [11]. Estimated to be 1/400–1600 births with the prevalence of 0.25% among the general population. We encountered only one case of horseshoe kidney where the patient completed treatment without any complications.

A close embryologic relation exists between the development of the urinary and reproductive organs. Hence renal tract defects are likely to be found in women with Müllerian duct malformations. In our study the prevalence of anatomical anomalies in cancer cervix patients was found to be 2.9%. According to Chan Y.Y and Dreisler, the prevalence of uterine congenital abnormalities was 6.7% in a review of unselected populations and 9.8% in a general population- based study including trivial uterine defects [12, 13]. Uterine anomalies have been classified according to the American Fertility Society (AFS), which divides uterine malformations into seven main

groups [14]. The AFS classification has been traditionally used in many investigations into Müllerian duct anomalies and its universal acceptance facilitates comparison to earlier studies.

The association between renal tract and uterine malformations has long been recognized and a high incidence of renal tract anomalies is found in women with congenital uterine malformations [15, 16]. In our study, the prevalence of urinary tract anomalies in cancer cervix patients was found to be 2.7% and it constituted to be ninety three percent of all anomalies encountered. According to some studies [17, 18], Renal tract anomalies have been detected in 30-41 % of women with specific uterine anomalies such as uterine agenesis and unicornuate uterus. According to Smith NA, and Fedele L [19, 20], Congenital absence of one kidney has been the most common urologic anomaly associated with obstructive uterovaginal anomalies. In this study, the duplication of ureters has been the most common anomaly detected in cancer cervix patients. According to Hartman GW [21], a duplex collecting system is one of the most common congenital renal tract abnormalities, found in 0.7 % of the adult population.

Treatment of cancer cervix could be challenging in the presence of associated anatomical anomalies. As in case of duplication of ureters, the chances of accidental injury to ureter is very high especially if surgery is done laparoscopically. Unascended kidney poses difficulty in pelvic lymphnodal dissection. Anamolous iliac veins carry very high risk of vascular injury if not identified preoperatively. In our patients, we encountered difficulties during dissection of pararectal fossae, ureter, parametrial dissection and pelvic nodal dissection.

There are few data in literature regarding optimal technique, dose and method of radiotherapy in patients with pelvic kidney associated with cancer cervix [3]. Renal tolerance to irradiation depends on irradiated volume. Radiation induced damage is reduced if the dose delivered is less than 20 Gy. The dose to pelvic kidney can be reduced by IMRT. Marcus castilho *et al*. have reported a case of carcinoma of endometrium treated with adjuvant IMRT and the follow up renal evaluation was shown to be normal [22].

The observations made in this study are different from that of the previous studies but, the range of associated anomalies is the same. The point we wish to stress is to educate gynaecological surgeons about possibility of encountering anatomical anomaly as a surprise during surgery and make them more careful. Even though our study didn't have any major operation mortality, it may not be true in low volume centres.

Conclusion

We report a prevalence of 2.9% for congenital anomalies encountered while doing hysterectomy for cancer cervix. The commonest anomalies noted are duplication of ureter and pelvic kidney. Anatomical anomalies though rare, pose management challenges when encountered in cases of cancer cervix. Surgical methods and dissections need to be planned to protect urinary pathways especially in radical hysterectomy. Vascular anomalies need careful dissection during lymphadenectomy in pelvis. Radical hysetrectomies are challenging when associated pelvic anomalies are present and thus should be kept in mind particularly by low volume surgeons.

Compliance with ethical standards

Ethical approval: This study is a retrospective analysis of data obtained from hospital records of previously treated patients and no intervention was performed by any of the authors.

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Conflicts of interest: The authors declare that they have no conflict of interest relevant for this study

Informed consent: none of the patient details have been disclosed.

Table 2: Contributors

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