

# IMAGING SPECTRUM OF THE UNEXPECTED EXTRAABDOMINAL MASS LESIONS AT THE PELVIC COMPONENT OF THE ROUTINE ABDOMINOPELVIC CROSS-SECTIONAL RADIOLOGIC EXAMINATIONS

## Original Article

## RUTİN ABDOMİNAL KESİTSEL İNCELEMELERİN PELVİK KOMPONENTLERİNDE SAPTANAN BEKLENMEYEN EXTRAABDOMİNAL KİTLE LEZYONLARININ GÖRÜNTÜLEME SPEKTRUMLARI

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**Running title:** Unexpected pelvic masses on cross-sectional radiological examinations.

### ABSTRACT

**Purpose:**In abdominopelvic cross sectional imaging, a spectrum of pathologies other than gastrointestinal and urogenital system, can be seen through the pelvic sections. With this study we aimed to classify the incidental pelvic mass lesions which do not correspond with their prediagnoses.

**Materials and Methods:** During study, 290 cases which have been reported as having pelvic pathology or masses on CT between May 2005- June 2007 were reviewed respectively. With the pathology reports of 23 cases and 2 years follow up results of the rest, the imaging protocols,

prediagnoses, and the images were re-viewed.

**Results:** Neoplastic mass lesion (n=71; 32 benign, 24 primary malignancy of the bone and soft tissues around the pelvic rim, 15 metastatic lesion), infectious-inflammatory mass (n=54), postoperative-posttraumatic changes (n=68), Paget disease (n=1), fibrous dysplasia (n=1), pelvic lipomatosis (n=1), bone island (n=29), Klipel-Trenaunay Syndrome (n=1), bone variation (n=59), pelvic kidney (n=5) were found. Totally, extraintestinal, extraurinary and extragenital masses were comprised %4.2 of the 6900 routine abdominal sectional imaging.

**Conclusion:**In pelvic region, with abdominopelvic CT imaging other than gastrointestinal, urinary and genital system a diversity of lesions can be seen. Familiarity with these distinct entities will help determine the lesions's extents and to diagnoses.

**Keywords:***Pelvic Infection; Pelvic Neoplasms; Cross-Sectional Imaging.*

## ÖZET

**Amaç:**Abdomino pelvikkesitsel görüntüleme, pelvik kesitler boyunca, gastrointestinal-ürogenital sistem dışında da değişik patolojik spektrumda lezyonlar tespit edilebilmektedir. Bu çalışmada, öntanırları ile uyuşmayan insidental pelvik kitle lezyonlarını sınıflandırmayı amaçladık.

**Materyal ve Metodlar:**Çalışma süresince (Mayıs 2005-Haziran 2007 tarihleri arasında), retrospektif olarak taranan ve BT (Bilgisayarlı Tomografi) kesitlerinde pelvik patoloji veya kitle raporlanmış 290 olgu incelendi. Olgularda 2 yıl boyunca elde edilen takipler ve 23 olgunun patoloji kayıtları ile birlikte görüntüleme protokolleri, öntanırlar ve görüntüler değerlendirildi.

**Bulgular:**Neoplastik kitle lezyonları (n=71; 32 benign, 24 pelvik rim kemik ve yumuşak doku kaynaklı primer kitle lezyonu, 15 metastaz), infeksiyöz-inflamatuar kitle (n=54), postoperatif-posttravmatik değişiklikler (n=68), Paget hastalığı (n=1), fibröz displazi (n=1), pelvik lipomatosis (n=1), kemik adacığı (n=29), Klipel-Trenaunay Sendromu (n=1), kemik varyasyonları (n=59), pelvik böbrek (n=5) tespit edilmişti. Total olarak, tüm 6900 olgunun %4.2'sinde extraintestinal, extrauriner ve de extragenital yerleşimli bir kitlesel lezyon tespit edilmişti.

**Sonuç:**Pelvik bölgede, abdominopelvik BT görüntüleme sırasında, gastrointestinal, uriner ve genital sistem dışı çok çeşitli lezyonlar ile karşılaşılabilir. Bu tip antitelere aşına olmak, lezyon uzanımlarının ve tanısının tespitine yardımcı olacaktır.

**Anahtar Kelimeler:** *Pelvik İnfeksiyon; Pelvik Tümörler; Kesitsel Görüntüleme.*

## INTRODUCTION

CT and MRI are the most commonly preferred and used modalities in radiological imaging for abdomino-pelvic cross-sectional examination (1). These cross-sectional methods are the most frequently preferred modalities in the detection and monitoring of the source of malignancy, infection, and inflammation, as well as the expansion of the pathology, particularly due to their contrast protocols or sometimes in the cases where direct graphy and sonography are inadequate or unavailable (1, 2). Since the pelvic region is a junction including the gastrointestinal system, urogenital system, muscle-skeletal system, and nervous system that exist together in a complex anatomy, the lesions are distributed within a wide range. Coexistence of various systems in a relatively small area and the pathologies that show symptoms not in the original site but in the adjacent sites due to compression or infiltration may lead to

clinical or radiological inconsistency (2, 3). We, with the present large-scale study, aimed to present the cross-sectional radiological images of misleading pelvic lesions that look like intra-abdominal pathologies.

**MATERIAL AND METHOD**

Reports of totally 6900 cases, who had presented to the CT and MRI units of our hospital between May 2005 and July 2007, were screened, the cases with abdomino-pelvic imaging reports were separated, and the reports including a conclusion that reveals pathology on pelvic sections were recorded. When the likely pathological data group (intra-abdominal and urogenital system pathologies) stated in the prediagnoses was compared with the radiological cross-sectional imaging findings in 378 cases, in which pelvic cross-sectional examination showed abnormal findings, the outcomes indicated different systems (extra-pelvic and extra-abdominal pathologies). Of these 378 cases, 290 (121 female and 169 male; mean age 39 years) cases with available clinical, laboratory and follow-up outcomes were included in the study. The diagnosis had been made pursuant to histopathological findings (true-cut biopsy:12, surgical:11) in 23 cases, to FNAB in 73 cases, to both CT and MRI in 65 cases, and by means of evaluating two-year follow-up results together with diagnostic radiological images (such as lipoma, osteochondrom, bone islet, fracture, sclerosis, fibrous displasia, and congenital anomalous) in the remaining cases. Cases with pelvic ectopic kidney (n=5) were also included in the study because of being consonant with the anomaly in the systems different from that initially predicted; however, they were not included in the statistical analyses. The patients that could be contacted before the study (218 cases) were informed about the study principals and their verbal consents were obtained to use the images and findings without using their names. It was found unnecessary to

apply for the approval of the ethical committee for this retrospective study.

The archived images were re-evaluated and interpreted for each case from the iliac crest to the inferior aspect of symphysis pubis. The CT systems used during these examinations were either spiral (n=115) or 16-detector CT (n=175). Totally 65 cases had undergone additional evaluation via MRI. Intravenous contrast agent (1.5 ml/kg nonionic contrast agent in CT and 0.2 mmol/kg gadolinium based paramagnetic contrast agent in MRI) had been used during all MRI and 147 CT examinations. Among all contrast-enhanced CT examinations, contrast dynamic protocol had been used in 39 and monophasic (in the way that portal-venous phase could be seen) had been used in the remaining. The 1.5 T system had been used in all patients that underwent MRI, whereas routine contrast-enhanced pelvic method had been used in 51 cases. The examinations were performed by the radiologists with two to 14-year experience that have been working at the same unit. Device-reading-technology differences and patient population characteristics were evaluated in the course of the study screening all the examinations that have different study protocols. Neither the differences nor the relationships between these multiple variables were taken into consideration in order the aim of the study not to deviate.

**RESULTS**

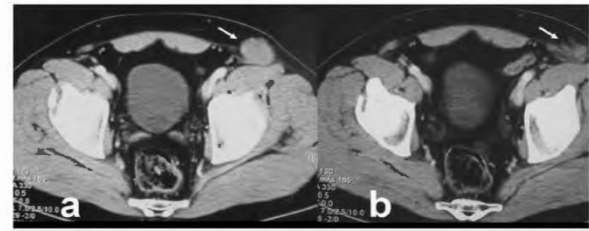
The data of totally 290 cases that had been diagnosed after their laboratory, follow-up and diagnostic processes were completed, are summarized in **Table 1**.

|  |                            |   |  |                                     |                            |
|--|----------------------------|---|--|-------------------------------------|----------------------------|
| Primary tumoral lesions (n=56)<br><i>Malignant (n=24), Benign (n=32)</i> |                            | Neoplastic (Metastasis from...)<br>(15) | Infectious-Inflammatory Conditions<br>(n=54) | Postoperative-Posttraumatic<br>(68) | Others<br>(n=97)           |
|  |                            | Breast (n=2)                            | Phlegmone<br>(11)                            | Lymphocele<br>(n=3)                 | Paget disease<br>(n=1)     |
| Chondrosarcoma<br>(n=3)  | Aneurysmal bone cyst (n=2) | Prostate<br>(n=2)                       | Muscle injury (n=3)                          | Haematoma<br>(n=17)                 | Fibrous dysplasia<br>(n=1) |

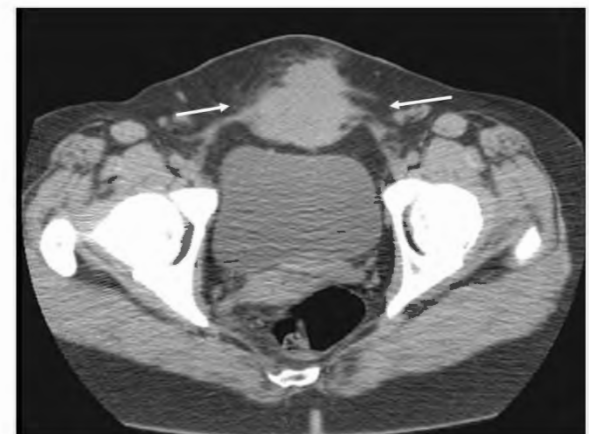
|                                      |                           |                            |  |                                     |   |
|--------------------------------------|---------------------------|----------------------------|--|-------------------------------------|---|
| Lymphoma (n=9)                       | Bone Cyst (n=7)           | Lung (n=4)                 | Myositis (n=4)                               | Complicated fracture-sequela (n=37) | Pelvic lipomatosis (n=1)                |
| Malignant fibrous histiocytoma (n=3) | Neurofibroma (n=3)        | Nasopharynx (n=1)          | Tuberculosis-arthritis (n=3)                 | Infection (n=11)                    | Nonspecific sclerosis-Bone islet (n=29) |
| Rhabdomyosarcoma (n=2)               | Lipoma (n=8)              | Renal cell carcinoma (n=3) | Highly degenerative hip joint disease (n=15) |                                     | Klippel-Trenaunay Syndrome (n=1)        |
| Osteosarcoma (n=1)                   | Myositis ossificans (n=2) | Colon (n=3)                | Sacroiliitis (n=10)                          |                                     | Skeletal variation (n=59)               |
| Chordoma (n=2)                       | Osteochondroma (n=3)      |                            | Hip, aseptic necrosis nekroz (n=2)           |                                     | Pelvic kidney (n=5)                     |
| Ewing Sarcoma (n=3)                  | Desmoid tumor (n=2)       |                            | Abscess formation-iliopsoas bursa (n=9)      |                                     |   |
| Retroperitoneal liposarcoma (n=1)    | Giant cell tumor (n=3)    |                            |  |                                     |   |
|                                      | Lymphangioma (1)          |                            |  |                                     |   |

**Table 1.** The last diagnoses in 290 cases with extraintestinal-extraabdominal pathologies

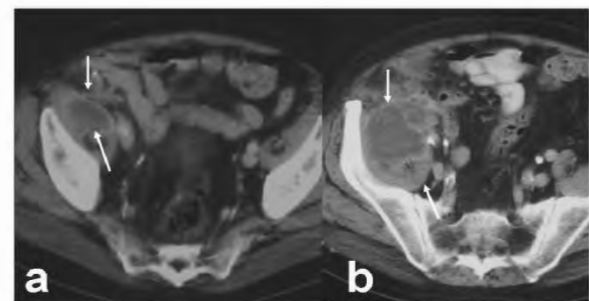
Table 1 displayed the presence of neoplastic mass lesion (32 benign, 24 primary malignancy, 15 metastatic malignancy) in 71, infectious-inflammatory mass lesion in 54, postoperative-posttraumatic soft tissue alterations in 68, Paget disease in one, fibrous dysplasia in one, pelvic lipomatosis in one, bone islet in 29, Klippel-Trenaunay Syndrome in one, osseous abnormalities in 59, and pelvic ectopic kidney in five cases. As is seen, a large population (n=6900) has been further evaluated via cross-sectional investigation in terms of intra-abdominal pathology, and unexpectedly, totally 4.2% (n=290) pathologies inconsistent with prediagnosis (extraabdominal, extraintestinal) were determined. The sample cases were shown together with figures and images provided that they would be defined in the footnotes in detail (**Figure 1-4**).



**Figure 1.** A case referred for open abdominal CT with diverticulitis prediagnosis. a) A 4 cm, dense, homogeneous mass lesion with regular contour (external oblique abdominal muscle hematoma) is observed in the left inguinopelvic junction (arrow). b) A little sample of hemorrhagic fluid has been obtained from this organized hematoma. Moreover, it takes attraction that this lesion has almost completely resolved after three weeks only with follow-up (arrow).

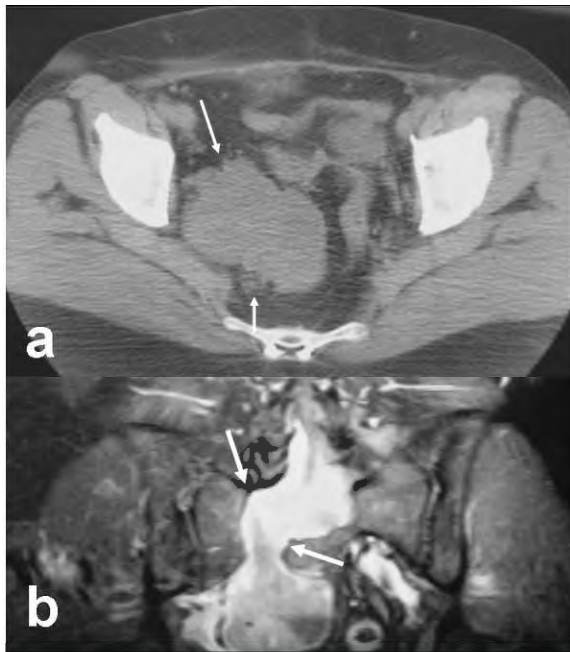


**Figure 2.** The abdominopelvic CT that performed to eliminate ileus-invagination in the case with intermittent abdominal pain, nausea and vomiting anamnesis shows mass lesion with irregular contour that infiltrated into rectus muscle (between the arrows) (consistent with endometriosis).



**Figure 3.** The case that presented with clinical and laboratory data reminding of perforation and complicated appendix and that had been evaluated with CT in emergency conditions. Abscess formation that shows peripheral contrast agent uptake and a) begins from the psoas trace on axial sections and b)

shows continuity along the iliopsoas contour (between the tips of arrows).



**Figure 4.** The case presented with abdominal pain, abdominal distension, and palpable mass in the right lower quadrant of the abdomen and prediagnosed with ovarian lesion? a) A mass lesion with lobular contour that completely fills the right adnexial space on axial CT image (between the arrows) b) Hyperintense mass lesion beginning from the right first sacral foramen (between the arrows) and extending into the abdomen has been detected on coronal plane T2A sequence (neurofibroma).

## DISCUSSION

Incidental findings during pelvic image examinations have been of great interest, even in the studies performed long time ago, because of coexistence of various organ and tissue types (1). While urine bladder, prostate, uterus, and intestines and the contents are localized in the abdomen, surrounding bone, muscle, tendon, and nerve systems complexly exist together in this junction (2-5). In the present study, different from the previous studies, we re-evaluated the pelvic sections using CT, MRI, biopsy, and surgery findings together being aware of that, numbers of pathologies can emerge from various tissues. In this way, in the patients investigated for intra-abdominal pathologies in fact, we showed that

various types of lesions could be located intra-abdominally, different from the localizations indicated by the symptoms. Literature review showed that studies on similar subjects have focused on a specific incidental lesion (6-9).

The main goal of the present study is to highlight the imaging findings and the importance of the pathologies, particularly those with extra-peritoneal localization that are likely to occur in a complex anatomic localization such as pelvis, rather than the prevalence of incidental lesion. Therefore, we evaluated, in fact, the cross-sectional images of the cases that had been screened for intra-abdominal pathology. In this group, we determined and recorded the findings of the extra-abdominal pathologies originated from another source and spread within the imaging spectrum. The most significant data of the present study was the incidental extra-abdominal malignancy, instead of searched intra-abdominal pathology, found in 71 cases, of which 39 were malign (15 metastatic). Such a high outcome means that, tumoral lesions are likely to exist with an unexpected prevalence of 0.35% (primary- malign+benign) and 0.56% (malign- primary malign+metastasis) in the pelvic components of unhealthy cases that require further evaluation via abdomino-pelvic cross-sectional examination in terms of gastrointestinal or genitourinary system pathologies.

Briefly, in the current age, in which the studies conducted to make the molecular imaging a part of routine examinations have been accelerated, cross-sectional abdominopelvic examination, even not relevant, detected the malignancy first in 56 of per 10.000 screenings. This may be considered even as the unique benefit of the increased use of radiology due to numbers of analyses that cause unnecessary exposure to radiation.

When the symptoms, clinical findings, and laboratory results were evaluated together, this present study revealed that,

although an abdomino-pelvic (intestinal, urinary and genital) infectious-inflammatory pathology was thought, the target lesion was localized in the pelvis by 0.78% but originated from the muscle-skeletal system, different from the above mentioned three systems. Although the rate is low, it will be beneficial in any condition to identify the pathology and its localization and to make the differentiation whether intraabdominal or extraabdominal, particularly in symptomatic cases, since it would change the therapeutic approach in general.

On the other hand, although their operation and trauma history were known and although was not predicted, it was related to the stress experienced within the last 12 months in 0.98% (n=68) of the patients in the group included in the study due to the preexistent symptoms. As was shown in some other studies, incidental findings may sometimes require more attention and monitoring than the diagnosis and treatment of the screened disease (10, 11). For example, some data from the literature reported the presence of concomitant non-coronary cardiac pathologies (effusion, cardiomyopathy etc.) in 20% of the cases that undergone coronary by-pass surgery and 4.2% of them required preferable treatment because of these incidental pathologies (10-14).

In some other studies, pathologies that were unable to be detected on inspection and palpation had been identified on cross-sectional examination and reasonably were discussed under the name of "incidental" (6). Different from such screenings, the large patient population in this present study was symptomatic. Moreover, prediagnosis of these cases required further evaluation via cross-sectional examination. Despite the palpable 101 lesions in total, localizations could have not been identified with physical examination findings only even in these cases.

Although extraordinary anomalies of skeletal system [Paget disease (n=1), fibrous dysplasia (n=1), pelvic lipomatosis (n=1), Klippel-Trenaunay Syndrome (n=1)] were rare (0.06%); ordinary and frequently known osseous anomalies (benign entities such as variations and bone islet) were defined in 88 cases. Despite the fact that the anomalies identified in these cases have been localized in the same side with the symptom, they were of no importance since they were defined as variant, benign, or structural.

Extraordinary pathologies may be detected at high rates (12.5%) even in the cases with hematuria that have been further re-evaluated by multi-sectional contrast-enhanced urographic CT (15). The extraordinary changes (such as Paget disease, fibrous dysplasia, pelvic lipomatosis) found in the present study were benign entities that could easily be defined on CT sections. Although the detection of such variants and pathological conditions does not seem life threatening at the first stage, detection would be beneficial in preventing unnecessary use of medications including analgesics, antiinflammatory agents, and antibiotics. Moreover, knowing the plane pathologies of bone tissue and deeply localized soft tissue at the beginning, which are detected by cross-sectional examination but cannot be identified via either graphy or US, and reporting them will prevent unnecessary time-loss during routine screening of the cases.

In the present study, there was neither cross-sectional examination protocol nor reader and device standardization, and the patient population has not been selected on purpose. The patients were screened from the archives of the group that underwent routine examination. We did not consider this condition as a limitation but advantage, since it reflected the incidental lesions of an important group with extraabdominal-pelvic localization and provided a data support

that could reflect the cases applied routinely.

In conclusion, when abdomino-pelvic region was screened to eliminate a gastrointestinal or genitourinary system-related pathology in the cases presented to the hospital, pelvic sections will show an additional and unexpected anomaly in 4.2% of the cases. Additional findings may be of such importance that can lead to a change in the medical or surgical therapy approach or in the treatment and follow-up protocols.

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