This article illustrates causes of pelvic pain in girls and women that may be inadequately diagnosed by ultrasound (US) and more adequately assessed by magnetic resonance imaging (MRI). We describe MRI features necessary for detecting disease and helpful in differential diagnosis. Special attention is paid to correlating age and pathology by subdividing the population into four categories: girls up to prepubertal age, pubertal girls, women of reproductive age and postmenopausal women. US is the first-line imaging modality in children and women with pelvic pain, and computed tomography (CT) is usually requested, especially in emergency settings, in patients in whom US is inadequate for diagnosis. However, MRI should be considered at least in urgent, if not in emergent, care given the wide range of female pelvic disorders that can be correctly assessed thanks to the excellent soft-tissue contrast, high spatial resolution and ability to depict blood products. Moreover, MRI should be preferred in children and women of reproductive age because of the absence of radiation exposure.

**Keywords** Magnetic resonance imaging · Female imaging · Pelvic pain

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Riassunto

Questo articolo illustra le cause del dolore pelvico di natura ginecologica che possono non essere correttamente individuate o che sono dubbie all’ecografia e che appaiono meglio identificabili con risonanza magnetica (RM). Verranno forniti gli elementi di semeiotica RM necessari per la diagnosi e quelli utili per la diagnostica differenziale. Verrà, inoltre, prestata una particolare attenzione nel correlare età e patologia suddividendo la popolazione femminile in 4 categorie: neonate e bambine fino all’età pre-pubere, ragazze al menarca, donne in età fertile e donne in menopausa. L’ecografia è solitamente il primo esame utilizzato nei bambini e nelle donne con dolore pelvico e nei casi dubbi è la tomografia computerizzata ad essere impiegata, in particolare in emergenza. Tuttavia, quando l’ecografia non sia risolutiva bisognerebbe prendere in considerazione la RM, se non in emergenza almeno nei casi di urgenza differibile, in quanto essa è in grado di identificare un ampio spettro di patologie responsabili del dolore pelvico di natura ginecologica grazie alla sua eccellente risoluzione spaziale e di contrasto e alla capacità di identificare i prodotti di degradazione della emoglobina. Non bisogna inoltre dimenticare che la RM dovrebbe essere preferita nei bambini e nelle donne in età riproduttiva a causa dell’assenza di radiazioni ionizzanti.

**Parole chiave** Risonanza magnetica · Imaging della donna · Dolore pelvico
Introduction

Ultrasound (US) is the primary modality for evaluating lower quadrant pain in young girls and women [1]. However, transabdominal and transvaginal US might be inconclusive, even when combined with colour and pulsed Doppler images [2]. Computed tomography (CT) exposes patients to ionising radiation, which can be problematic, especially in young people [3]. Magnetic resonance imaging (MRI) is a reliable modality for evaluating the pelvic region because of its excellent soft-tissue contrast, high spatial resolution and ability to demonstrate blood products [4]. Furthermore, the lack of radiation is a benefit. Despite its relatively high cost, lengthy examination time and reduced availability, which limit its routine use, MRI is a reliable complement to US in patients with suspected gynaecological disorders, as the range of conditions correctly assessed is extremely broad. Moreover, MRI could be a crucial diagnostic tool in virgins if transabdominal US is unable to provide a diagnosis and transvaginal US is denied.

Specific painful gynaecological disorders inadequately diagnosed by US but more adequately assessed by MRI are analysed in this article. This review correlates age and pathology by subdividing females into the following categories: from childhood to prepubertal age, pubertal-age girls, reproductive age and postmenopausal age. MRI features and elements for the differential diagnosis are described.

Girls up to prepubertal age

Pelvic diseases causing pain in children are more often related to gastrointestinal pathologies and urinary tract abnormalities [5]. The reported frequency of appendicitis in symptomatic young patients is 41% [6], whereas vesicoureteral reflux shows an incidence of 25–40% in children with urinary tract infection [7].

Pelvic pain related to female genital alterations is very rare in children [8–10] and is usually related to torsion of an ovarian cyst, hydrocolpos or hydrometrocolpos, and to torsion of the Fallopian tube and ovary. The isolated torsion of the ovary and the Fallopian tube rarely develop before menarche [11] but can occur in children with excessive mobility of the adnexa, even without ovarian abnormalities [12].

Ovarian cysts

The incidence of ovarian cysts in the prepubertal age is 2–5% [8]. B-mode US is usually employed as a first diagnostic step in symptomatic children [1], and in the case of torsion, an anechoic adnexal mass with corpuscular content is easily documented on sonograms. A corpuscular content characterised by a fluid-debris level has been described as