Al-Mustaqbal university college

Radiological Techniques Department

PROTECTIVE SHIELDING

By
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3rd class

Radiation Protection

Lecture -11

Practical

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PROTECTIVE SHIELDING

Need for Protective Shielding

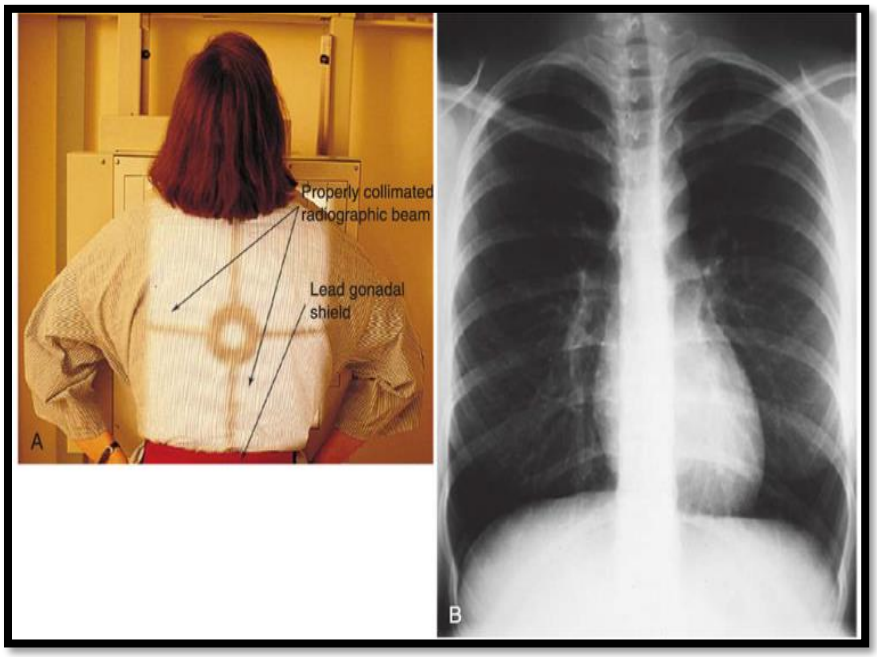
The potential for radiation exposure to the radiosensitive body organs or tissues of a patient requires the use of intelligent patient positioning or personal shielding (i.e., a device made of lead or lead-impregnated materials that will adequately attenuate ionizing radiation) to reduce or eliminate.

*Areas of the body that should be shielded from the useful beam whenever possible are the

- Lens of the eye
- Breasts
- Reproductive organs

Gonadal Shielding

Use of Gonadal Shielding Devices. Gonadal shielding devices are used on patients during diagnostic x-ray procedures to protect the reproductive organs from exposure to the useful beam when these organs are in approximately 5 cm of a properly collimated beam. Gonadal shielding is used unless it will compromise the diagnostic value **(Fig. 11.1)**, first step in gonadal protection.

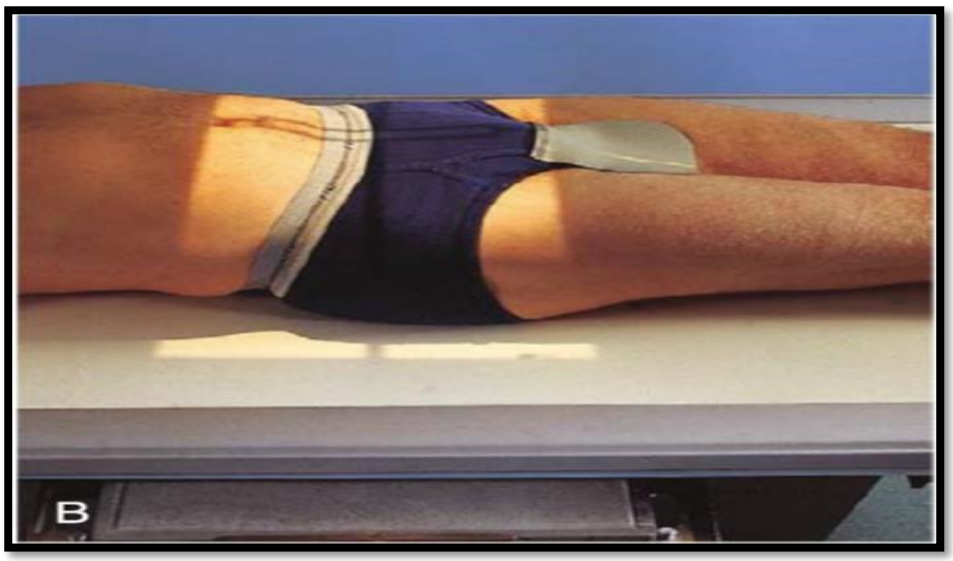


(Fig 11.1) A, Adequate and precise collimation of the radiographic beam must always be the first step in gonadal protection. **B**, When the gonads are not in the area of clinical interest, precise collimation of the radiographic beam reduces gonadal exposure Dose Reduction from the Use of Gonadal Shielding for Female and Male Patients.

As a result of their anatomical location, the female reproductive organs receive three times more exposure during a given radiographic procedure. Reproductive exposure to both male and female patients can be significantly reduced by the application of appropriate shielding. For female patients, the use of a flat contact shield placed over the genitals reduces exposure by about 50% **(Fig 11.2, A).**

(Fig 11.2)A, Contact shield correctly placed over the reproductive organs of a female patient

The initial beam exposure for male patients can be reduced by as much as 90% to 95% when the gonads are also covered by a contact shield **(Fig. 11-2, B).**



(Fig 11.2)B, Contact shield correctly placed over the reproductive organs of a male patient.

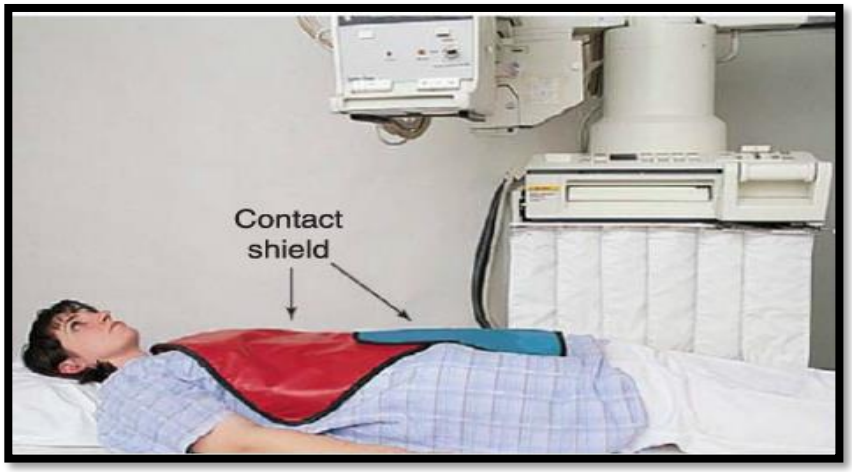
Placement of Gonadal Shielding Devices.

When a gonadal shield is used during radiation exposure, it must be properly positioned directly over the patient's genitals to provide protection for the genitals, as in **(Fig 11.2)** The patient's external anatomical landmarks can be used to guide the placement of the testicular shield or ovary. The shield should be placed approximately 2.5 cm (1 inch) apart for each palpable superior anterior iliac spine.

Types of Gonadal Shielding Devices. The following four basic types of gonadal shielding devices are used:

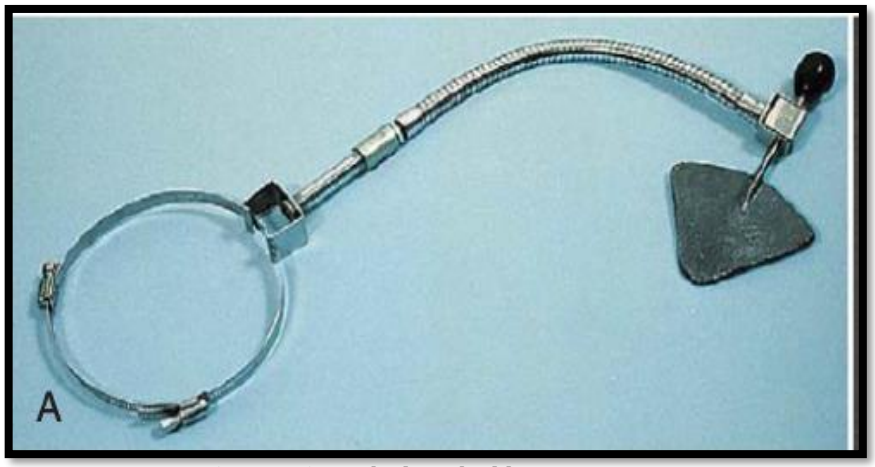
1. **Flat contact shields**
2. **Shadow shields**
3. **Shaped contact shields**
4. **Clear lead shields**

1- **Flat Contact Shields.** Flat contact shields are made of lead strips or lead-impregnated materials 1 mm thick. These shields can be placed directly over the patient's genitals **(Fig. 11.3)**. These shields are most effective when used as protective devices for patients undergoing anterior posterior (AP) or posterior (PA) radiography while in the supine position. If a flat contact shield is used during a typical fluoroscopic examination, it should be placed under the patient to be effective because the X-ray tube is located under the radiographic table. However, some fluoroscopy tubes are located above the patient and are referred to as "far" rooms because the staff prepares the patient for examination and then leaves the room before the X-ray tube is activated. In these rooms, the shield should be placed over the patient



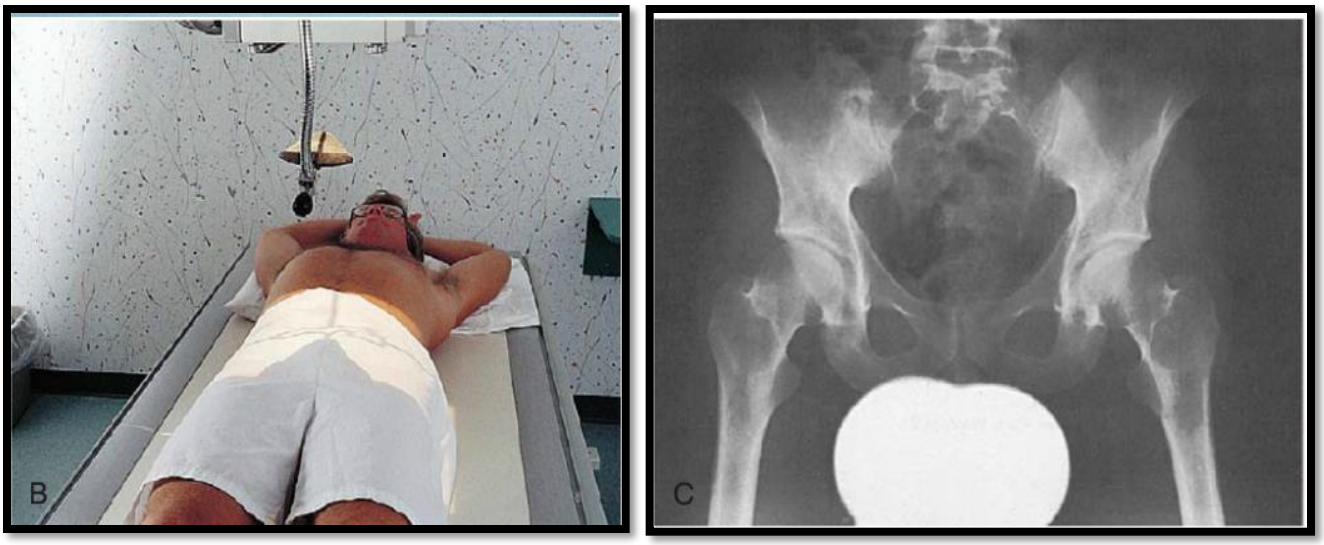
(Fig 11.3)An uncontoured, flat contact shield of lead-impregnated material may be placed over the patient's gonads to provide protection from x-radiation during a radiographic procedure .

2- Shadow Shields.Shadow shields are made of a radiopaque material **(Fig. 11.4, A).**



(Fig 11.3) A, Shadow shield components

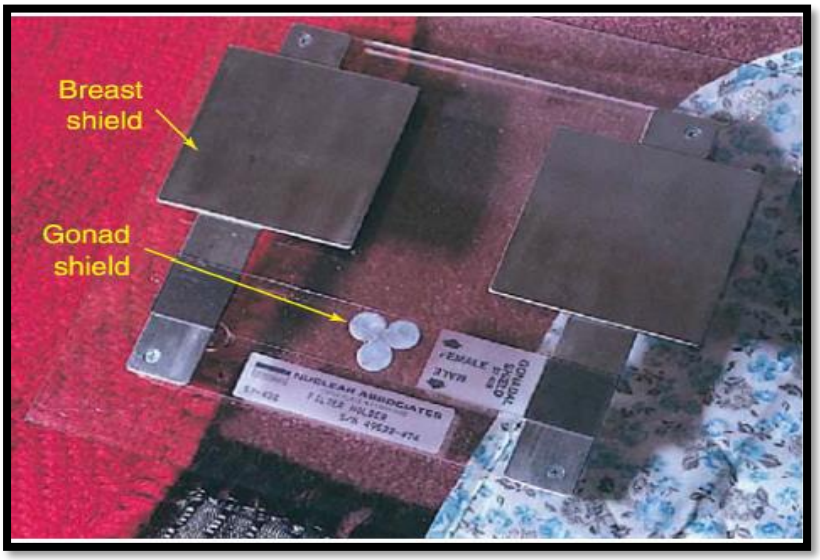
Suspended from above the radiographic beam-defining system these shields hang over the area of clinical interest to cast a shadow in the primary beam over the patient's reproductive organs **(Fig. 11.3, B and C).**



(Fig11.3) B, A shadow shield suspended above the radiographic beam defining system casts a shadow over the protected body area, the gonads. C, The radiographic image demonstrates effective gonadal shielding resulting from the use of a shadow shield.

The lead filter shown in **(Fig 11.4)** acts as a shadow shield and is used to protect the breasts and gonads. When the shield is positioned correctly, it provides protection from the radial beam as efficiently as a contact shield. The shadow shield is not suitable for use during fluoroscopy because there is no defined field of light and the field of view is usually moved during the study. However, shadow shields can be

used effectively to provide gonadotropic protection in a sterile field or when examining helpless patients

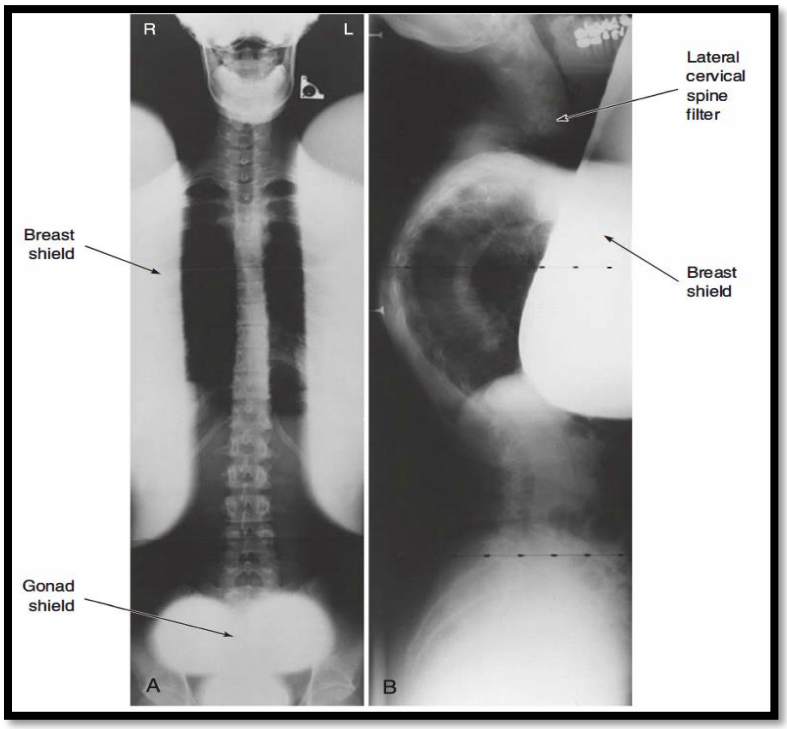


(Fig 11.4) Lead filter with a breast and gonad shielding device. This shield functions as a shadow shield

Shaped Contact Shields. Contact shields, containing 1 mm of lead, are designed to surround the male genitals. Disposable, washable athletic braces or track pants act as holders for these shields. These mounts contain a pouch into which the shield is placed **(Fig. 11.2)** and the shield's cup-like shape allows it to be comfortably placed over the scrotum and penis. Formed contact shields are not recommended for PA projections because the shield covers only the anterior and lateral surfaces of the genitals

(Fig 11.5) Shaped contact shields (cuplike in shape)may be held in place with a suitable carrier

Clear lead Shields. Some basic gonad shielding devices such as contact shields are being replaced by lead shields and breast shields **(Fig. 11.4)**. These shields are made of transparent lead acrylic material impregnated with approximately 30% lead. **(Fig11.6)** shows a complete examination of spinal scoliosis, a transparent, lightweight, and fully transparent lead filter is incorporated to provide uniform density throughout the spine.



(Fig 11.6) A. Anteroposterior radiograph of a patient with full-spine scoliosis demonstrates a lead filter with breast and gonad shields. B, Lateral radiograph of patient with full-spine scoliosis, with a lateral cervical filter and breast shield.

Specific Area Shielding

Need for Specific Area Shielding. Organs and tissues that are sensitive to radiation can be protected, other than the genitals, intraocular shields are always of direct contact type to the patient. These shields are used to reduce or eliminate exposure to that highly sensitive area. Areas of breast tissue can be protected with a transparent lead shield **(Fig 11.4)**. To provide protection during examinations

Benefit of Specific Area Shielding. Patients can be protected by establishing effective protection programs in any health care facility. Patients of childbearing age should be protected during x-ray procedures when the diagnostic value of the examination is not compromised. This procedure reduces the number of potentially harmful mutations caused by X-rays.