Terminology for radiographic projections

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Every scientific discipline must agree its terminology and conventions. If this self-discipline is not exercised, confusion is inevitable and meaningful communication becomes impossible.

In the past few years, laxity in terminology with regard to radiographic projections has resulted in considerable confusion in the cardiac radiological laboratory and the published reports. This is because long established and universally agreed terminology and conventions have not been consistently applied to oblique cardiac radiographic projections which are now being increasingly used, especially for cine angiography, both in congenital heart disease and coronary artery visualisation.

It is the purpose of this editorial to urge the universal application of the two internationally approved, long standing conventions for describing any radiographic projection. These conventions are logical and very simple to apply, and it is hoped that they will be utilised whenever oblique cardiac projections are described—in the radiological suite, in academic reports, and in manufacturers' instructions or descriptions.

Convention I

The radiographic projection is labelled by the name of that part of the body next to the imaging device (radiographic cassette or image intensifier). This convention is readily applied whether the patient is stationary on the x-ray table and the x-ray tube and imaging device are moved in a transverse plane around him (Fig. 1a) as in most cine installations, or whether the patient lies in a cradle which is rotated along its long axis with the x-ray tube and imaging device remaining static (Fig. 1b), as with most full-sized serial film changer installations.

If the right posterior aspect of the chest is next to the imaging device (Fig. 1b), then the projection is labelled right posterior oblique (RPO). If the left anterior aspect of the chest is next to the imaging

device, then the projection is labelled left anterior oblique (LAO) (Fig. 1a).

NB—All Figures viewed from head of patient, looking towards the feet.

Fig. 1 (a) Undercouch x-ray tube (usual cine installation). Patient supine on table. Tube and image intensifier rotated so that left anterior aspect of the patient is next to image intensifier. Left anterior oblique projection. (b) Overcouch x-ray tube (usual "AOT" installation). Patient in a rotating cradle which is rotated so that the right posterior aspect of the patient is next to AOT film changer. Right posterior oblique projection. Both Fig. 1a and b provide very similar views as the central x-ray beam makes the same angle " α ", with the sagittal plane of the patient. The central x-ray beam will therefore traverse the same diameter of the patient and produce virtually identical radiographs. I.I., image intensifier; A.O.T., full-sized serial film changer.

As RPO and LAO aspects of the chest are diametrically opposed to each other, the *x*-ray beam passes through the same diameter of the chest in both projections, and the image produced is very similar in the two techniques.

Convention II

The radiographic projection is identified by the direction of the *x*-ray beam. The situation of the *x*-ray tube is first specified, followed by the situation of the imaging device. Thus the usual radiograph of the chest is taken with the *x*-ray tube posterior to the patient and the cassette in front of him—the projection is therefore called “posteroanterior”.

This convention is best applied to those projections in which the *x*-ray beam is tilted in the long

axis of the patient, that is axial tilts. It is essential to specify whether the *x*-ray tube lies behind or in front of the patient. Thus, in the usual cine installation, the patient lies supine on the horizontal *x*-ray table with the *x*-ray tube beneath the table and the image intensifier above the table. If the tube is displaced towards the feet of the patient and tilted in order to direct the beam towards the head end of the patient (Fig. 2a), the projection is called caudocranial posteroanterior.

In a minority of cardiac radiographic installations, the fluoroscopic or cine *x*-ray tube is situated above the patient (and the table), with the imaging device below the table. With this type of installation, the craniocaudal anteroposterior projection (Fig. 2b), will provide virtually the same image as the caudocranial posteroanterior projection with an under-

Fig. 2 Axial projections. (a) Undercouch *x*-ray tube (usual cine installation). *X*-ray tube angled towards head of patient so that *x*-ray beam travels in caudocranial direction. Caudocranial, posteroanterior projection. (b) Overcouch *x*-ray tube (unusual cine installation). *X*-ray tube angled towards feet of patient so that *x*-ray beam travels in craniocaudal direction. Craniocaudal, anteroposterior projection.

Fig. 3 Undercouch *x*-ray tube (usual cine installation). The *x*-ray tube is angled towards the feet of the patient so that the *x*-ray beam travels in craniocaudal direction. Craniocaudal, posteroanterior projection. (See also footnote to Fig. 2.)

Projection in Fig. 3 will provide a completely different view from Fig. 2a and b. The terms “craniocaudal” and “caudocranial” should be used to indicate the pathway of the *x*-ray beam emanating from the *x*-ray tube. These terms “craniocaudal” and “caudocranial” should be qualified by indicating whether the *x*-ray tube is below the table (as is conventional for cine recording) or whether the *x*-ray tube is above the table (as is essential for full-sized film radiographs).

I.I., image intensifier, to which is fitted the cine camera, which is not shown on the diagrams.

couch fluoroscopic tube (Fig. 2a), as the x-ray beam traverses the same plane of the patient in the two different circumstances. It is therefore important for both author and reader to know whether the x-ray tube is situated below the table (as is usual in cine installations), or above the table (an uncommon arrangement for cine angiography).

Confusion has arisen because some investigators and equipment manufacturers' technical reports and brochures erroneously call the under-table tube caudocranial view—"craniocaudal projection". The true craniocaudal projection with undercouch fluoroscopic cine x-ray tube (Fig. 3) is of course a completely different projection.

Compound oblique projections with rotations in both axial (or sagittal) and transverse planes are being more frequently used both for cardiac chamber and coronary artery cine visualisation. These projections are complex, and, unless the above conventions are clearly understood and always used, there will inevitably be confusion between the cardiologist, radiologist, and radiographer.

Unqualified terms such as "cranial" or "caudal" tilts are very confusing and unreliable for they will not be interpreted in the same way by different people. "Axial" tilt is best used to describe a tilt in the sagittal plane but it does not identify the

direction of tilt. Use of the above two conventions is absolutely necessary to avoid confusion.

In the usual cine installation (patient supine on the horizontal table, undercouch x-ray tube), the four-chamber "view" is both "left anterior oblique" (this projects the interventricular septum perpendicular to the film) and "caudocranial" (this projects the x-ray beam through the atrioventricular rings). The terms "four-chamber view" or, preferably, "left anterior oblique, caudocranial" should be applied to this important projection.

Universal application of the two simple conventions explained above will be a major advance in the cardiac radiological laboratory, for it will permit the greater understanding and collaboration between technical, clinical, and radiological staff, which is so essential. It is also important to adopt these universally agreed conventions in the academic and in the technical reports, for much confusion exists at present because of inappropriate terminology.

This Journal requests that these two simple and universally approved conventions be adopted in any paper submitted for publication.

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