Comment

The fall in differences in height between groups varying in intelligence and educational level is probably attributable to changing social factors, perhaps specifically a greater homogeneity of nutritional conditions across different social classes. In earlier data we found that the social class of parents correlated with the intelligence (0.32) and educational level (0.42) of their children. In the present data for 1939-58 the correlation between intelligence and educational level was 0.73.

The decline in differences among groups and the corresponding correlations seemed to be most pronounced among those generations who were in their infancy during the 1940s. The decline thereafter was less pronounced. Whether such differences will disappear remains to be seen, particularly as the increases in height seem to be ending. Records of the Danish draft board show the average height of men to have remained virtually stable at about 180 cm for almost the past 10 years.

The differences may, however, never entirely disappear. As there are important genetic contributions to both height and intellectual ability possibly the association between the two results in part from the influence of pleiotropic genes. The relations, however, are not overwhelming. The multiple correlation of height with the score on intelligence testing and educational level for the 1954-8 cohort was 0.238 (table), and thus these two factors together accounted for less than 6% of the variance for height.

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Value of anteroposterior radiography in cervical pain of non-traumatic origin

Janet E Page, Julie F C Olliff, Derek D Dundas

Department of Diagnostic Radiology, St George's Hospital, London SW17 0QT
Janet E Page, FRCR, senior registrar
Derek D Dundas, FRCR, consultant radiologist

Department of Diagnostic Radiology, Royal Marsden Hospital, Surrey
Julie F C Olliff, FRCR, senior lecturer

The need for anteroposterior radiography to assess the cervical spine after trauma is well recognised. In many radiology departments an anteroposterior radiograph is obtained routinely as one of a series of radiographs of the cervical spine in patients with pain of non-traumatic origin. These patients constitute a considerable proportion of the workload of a radiology department. We assessed the additional information, if any, gained from anteroposterior radiographs in these patients.

Patients, methods, and results

The anteroposterior and lateral radiographs of 151 patients were reviewed by three radiologists. Presenting symptoms included neck and shoulder pain, limitation of movement, and neurological deficit. The radiologists worked independently, and the anteroposterior view was assessed before the lateral view. All patients with a history of trauma to the cervical spine within three months of the examination were excluded from the study.

The results of lateral and anteroposterior radiography were normal in 23 (15%) patients. No abnormality was found in either the lung apices or the soft tissues of the neck.

Of the 151 lateral radiographs, 139 showed all seven cervical vertebrae. Narrowing of the disc space was present in 101 patients, most commonly at C5-6 (86 patients). Thirteen of these patients had narrowing of the disc space at more than three positions. A total of 111 patients had osteophytic changes, which were visible in the lateral radiographs of 107 patients. Thirteen patients had minor vertebral malalignment, 12 of whom had other evidence of degenerative disease. Twenty one patients had localised kyphosis. Two patients had erosive changes.

Of the 151 anteroposterior radiographs, 127 showed vertebrae C3-7. A separate projection (with the mouth open) is usually necessary to show C1 and C2. Assessment of narrowing of the disc space was difficult: there was some interobserver variation and poor correlation with the findings in the lateral radiographs (table). Among the 111 patients affected, osteophytes

Abnormalities seen in anteroposterior and lateral radiographs of the cervical spine in patients with cervical pain of non-traumatic origin. Values are numbers of patients

Abnormality	Patients affected (n=151)	Patients in whom abnormality was seen in radiographs		
		Anteroposterior view only	Lateral view only	Both views
Osteophytes	111*	4	34	73
Malalignment	13		13	
Cervical ribs	6	5		1
Scoliosis	11	11		
Narrowing of disc space	101*			

*Assessment of radiographs was difficult: no correlation between anteroposterior and lateral views in 45 patients, some correlation in 38, total correlation in 18.

(in the neurocentral joints) were visible in only the anteroposterior radiograph in four cases, whereas they were seen in only the lateral radiograph in 34. Although the facet joints were best seen in the anteroposterior radiograph, in most cases disease of these joints was also detectable in the lateral radiograph, and in all cases there was other evidence of degenerative change. Six patients had cervical ribs. In four patients these were rudimentary, and two patients had a true unilateral cervical rib, which in one case was seen only in the anteroposterior radiograph. None of these patients had symptoms attributable to the rib, and four of the six patients had evidence of degenerative disease. Eleven patients had scoliosis on anteroposterior radiography, of whom 10 had degenerative changes that were also seen on lateral radiography.

Comment

The value of radiography in cervical spondylosis is questionable.¹ Oblique radiographs have been

Correspondence to:
Dr Page.

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shown to be unnecessary.² In our study the value of anteroposterior radiographs was limited to identifying neurocentral joint disease, scoliosis, and cervical ribs (these were the only abnormalities in seven of the 151 patients (<5%)) and assessing the facet joints, although in most cases changes were also detectable in the lateral radiographs.

We consider that the additional information gained from the anteroposterior view is limited and, in terms of both cost to the NHS (H M Saxton, unpublished data) and radiation given to the patient, does not

justify its routine use in patients with cervical pain of non-traumatic origin. We think that examination of such patients could be limited to the single lateral radiograph in the first instance unless a cervical rib is suspected.

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Unnecessary x ray examinations

M A P Bransby-Zachary, G R Sutherland

Royal Infirmary, Glasgow
G4 0SF

M A P Bransby-Zachary,
FRCS(Ed), orthopaedic registrar
G R Sutherland, FRCS,
consultant radiologist in
administrative charge

Correspondence to: Mr
Bransby-Zachary.

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The risks of radiographic examinations have been highlighted recently.¹ Most patients referred by their general practitioners to hospital clinics have already had a radiographic examination, but the films may not be available when the patient presents at the clinic and repeating the examination is often the most expedient solution. We present the results of a survey which defines the magnitude of this problem at our hospital.

Patients, methods, and results

At 45 consecutive orthopaedic clinics for new patients the details of any relevant x ray examinations carried out by the patients' general practitioners and the availability of the films were recorded. If the films were not available the action taken was noted. The type of centre where the examination was performed was identified.

Of the 420 patients seen, 141 had had 163 radiographic examinations arranged by their general practitioners, but only nine patients had x ray films available. Of the 132 patients whose x ray films were not available, 125 had their examination repeated, one patient was given a new appointment, and the remaining six either did not require radiographs or the report was adequate.

x Ray examinations had been performed in health centres for 92 patients and in hospital departments in the district for the others. Radiography of the lumbo-

sacral spine accounted for a third of the repeated examinations. Table I shows the results of a simple cost analysis. A third of all patients had repeat examinations because the original x ray film was not sent despite their request. A radiologist's report was available in nearly half the cases without x ray films, but this was considered inadequate as radiography is an integral part of the orthopaedic examination.

Comment

The regulations on ionising radiations state that for any radiological examination there must be a net benefit to the patient and that exposures must be kept to a minimum.² A duplicate radiograph does not fulfil these criteria. The risk to the individual of a repeat examination seems low: examination of the lumbosacral spine affords the patient an excess risk of 25×10^{-6} of developing neoplasia, but the genetic risk must also be added. As a third of all patients attending the orthopaedic clinic had an unnecessary duplicate examination the increase in the population risk is appreciable and a cause for concern.

There is no evidence that general practitioners should have their radiological facilities curtailed. The specialist ordered most of the repeat examinations so they can be assumed to be appropriate for effective patient management. A report of an examination alone is generally insufficient for adequate orthopaedic assessment; this should be made clear to doctors referring orthopaedic patients.

As a total of 3267 patients attended the orthopaedic outpatient department in the previous year in our hospital the extrapolated annual excess cost of the repeated radiographs is approximately £26 000. A full cost-benefit analysis has not been undertaken.

A considerable financial saving and a reduction in the population risk can be made by improved administrative arrangements and greater coordination between hospital and community services. Patients in the private sector who are made responsible for their own x ray films rarely lose them. Introducing such a system to NHS patients is one solution.

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Cost of repeated x ray examinations

	No of examinations performed with results unavailable*	No of repeat examinations	Cost (£)†	
			Each examination	Total
Cervical spine	11	11	20.00	220
Lumbar spine	56	54	26.00	1400
Knee	41	41	20.00	820
Ankle or foot	21	17	20.00	340
Other	34	33	20.00	660
Total	163	156		3440

*Some patients had more than one region x rayed.

†Based on DHSS category 2 changes.