radiographs of the hips yielded normal results. Computerised tomography of the pelvis and hips, a hip aspiration, and an arthrogram also yielded normal results. For three months there was no clinical improvement but one year after onset the pain had settled and full function had returned despite mild restriction of range.

All three patients were followed up for over one year after resolution and none developed any other joint disorder.

Comment

The three patients described were middle aged and developed hip pain of spontaneous onset and joint stiffness mainly affecting rotation. No evidence of a systemic disorder, local infection, or a lumbar spine problem was found. The isotope bone scans performed on two patients showed an increased uptake despite a normal erythrocyte sedimentation rate consistent with capsulitis. Spontaneous resolution of pain after some months was later followed by the return of movement. One patient was diabetic. The similarities to the clinical frozen shoulder are striking.

In the only previous report of a stiff hip condition believed to be due to capsulitis two patients were reported on who had frank capsular retraction on arthrography.[4] In the two patients in this report who had arthrography this was not found. Capsular retraction on arthrography is often not found in patients with frozen shoulders and is not essential for diagnosis, which is made on clinical grounds.[5]

We suggest that the "frozen hip" is a clinical entity, which can be distinguished from the "irritable hip" syndrome, which causes pain but only slight restriction of movement. Clinically, a frozen hip shows limitation of active and passive movements, rotation being particularly affected. Investigations to exclude systemic disease must yield negative results, but an isotope bone scan will show an increased uptake. Once the condition is diagnosed spontaneous resolution can be expected and the patient given a favourable prognosis. A detailed prospective study of such a group of patients should improve understanding of the phenomenon of joint capsulitis.

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Does wearing two pairs of gloves protect operating theatre staff from skin contamination?

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The effectiveness of surgical gloves in preventing contact between the surgeon's skin and the patient's tissue or body fluids during surgery has been questioned recently.[1,2] Although needlestick injuries that penetrate both glove and skin are painfully obvious,[1] it is more common for gloves to be punctured without the wearer's knowledge, which may result in prolonged contamination of the skin with potentially infective material.[2] Double gloving (wearing two pairs of gloves) is generally adopted by surgical teams operating on high risk cases and aims at reducing the risk of such incidents. We tested the effectiveness of this precaution in maintaining an intact barrier between the patient and the surgical staff.

Methods and results

Ten surgeons and nine scrub nurses in a surgical unit wore two pairs of gloves during general surgical operations on 144 consecutive patients. The gloves were tested at the end of the operation by a recognised method of detecting perforation.[3,4] Each glove was filled with one litre of water and subjected to external compression with the open end occluded. Punctures were indicated by a fine jet of water and their number and site noted for both the inner and outer gloves. The subject's role (surgeon, assistant, or scrub nurse) and grade were also recorded together with the duration and nature of the operation. Before the gloves were tested the subjects were asked if they were aware of any damage to the gloves. Data were analysed with the χ^2 test.

Numbers of punctures detected at different sites in 728 outer and inner gloves

	Left hand		Right hand	
	Outer glove	Inner glove	Outer glove	Inner glove
Thumb	6		1	
Index finger	33	5		
Third finger	6	1	4	1
Fourth finger	3		2	1
Fifth finger	1			
Palm	16	6	5	1

Punctures were detected in 77 (11%) of the 728 outer gloves tested (table) and occurred more frequently in those worn by surgeons (52/288, 18%) than in those worn by assistants (12/254, 5%; $p<0{\cdot}001$) or nurses (13/186, 7%; $p<0{\cdot}005$). Fifteen of the 77 inner gloves worn in these cases were also punctured, giving an overall rate of puncture of inner gloves of 2%; again the rate was higher for surgeons (13 inner gloves were punctured: 52 outer gloves, 25%) than for assistants (1:12, 8%) or nurses (1:13, 8%). No punctures were found in a control group of 20 unused gloves chosen at random or in inner gloves worn with outer gloves that were found to be intact when tested.

Most punctures (65) occurred in the left glove, particularly the index finger (33). Before testing 38 of the punctures had not been detected by the subjects.

The grade of the subject wearing the gloves, the duration of the operation, and whether the operation was elective or an emergency procedure did not have any effect on the puncture rate.

In 37 operations the outer gloves were removed before the end because of discomfort or loss of sensitivity, surgeons being more intolerant (all 37 of these operations (26%)) than assistants (20 (14%); $p<0{\cdot}02$) or nurses (11 (8%); $p<0{\cdot}01$).

Comment

This study confirms that wearing two pairs of gloves confers some protection against contamination of the skin with patients' tissue and fluids. The rate of puncture of outer gloves of 11% is similar to that reported previously[3,4] but a third of that in a recent study.[2] Surgeons seemed more at risk than assistants or nurses. The rate of perforation of inner gloves was only

2%, suggesting that double gloving maintained a barrier between the wearer and patient in four out of five cases in which the outer glove had been breached. This added protection is important as the subjects were unaware of half of the punctures until the operation was over. The greater vulnerability of the left hand, especially the index finger, has been observed previously in right handed surgeons.[1]

Acceptance of double gloving seems to depend on the person: some subjects in this study removed their outer gloves more frequently than others. Surgical staff will have to balance the enhanced safety of introducing a second barrier between themselves and the patients against possible discomfort or reduced sensitivity and dexterity.

We thank the medical and nursing staff of the department of clinical surgery for their willing participation in this study.

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Tetanus immunisation state in a general practice population

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Tetanus is most common in adults, and the incidence rises with age.[1] At present the Department of Health and Social Security recommends that tetanus immunisation should consist of a primary course of three tetanus toxoid injections followed by a series of booster injections at intervals of five to 15 years.[2] Provided a primary course has been given, even up to 30 years previously, a single booster is sufficient to restore protective levels of antibody.[3] In this practice we have adopted a policy of giving tetanus boosters every five years.

Adults may have received primary immunisation in three different ways. Firstly, all people in the armed forces, including non-combatants, have been immunised since 1938.[4] Secondly, childhood immunisation became possible when diphtheria, tetanus, and pertussis vaccine was licensed in 1953; it became the policy of Bradford Health Authority in 1959[5] and national policy in 1961.[2] Thirdly, people may be immunised in casualty departments or by general practitioners or occupational physicians.

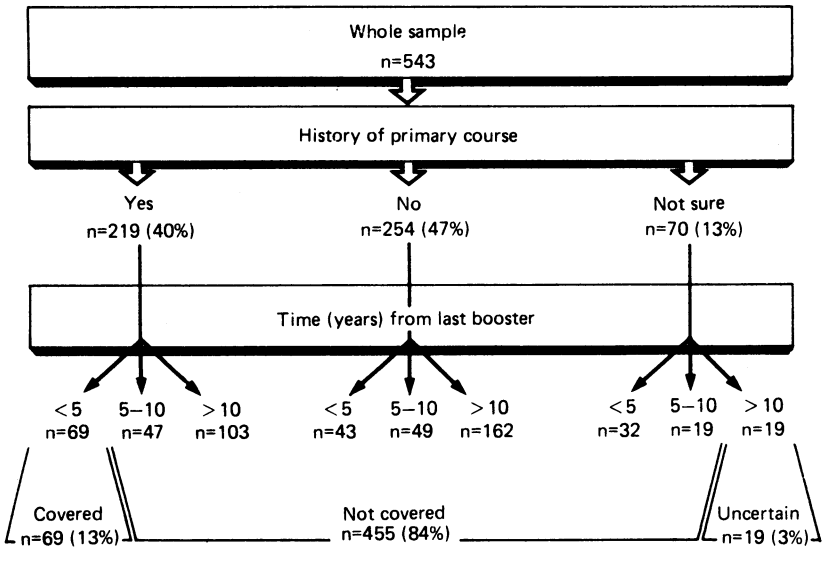
After one of our patients died of tetanus we investigated the immunisation state of the adult population in our practice.

Patients, methods, and results

We devised a questionnaire based on the three main ways of receiving primary tetanus immunisation. Respondents indicated their age and sex and whether they had served in the armed forces, received immunisation in infancy, or had a course of three tetanus injections in adult life. We assumed that people born before 1958 were unlikely to have been immunised in infancy as they were over 1 year old by January 1959. We also assumed that people who had received a primary course of immunisation as an adult would remember having attended for a series of three injections. The interval since their last tetanus injection was stated, and if this exceeded five years they were advised to attend for immunisation. Respondents indicated whether they planned to follow this advice.

Six hundred patients consecutively attending this surgery were given the questionnaire by the receptionist, and they completed it while waiting for their appointment. Of 543 who gave a valid response, only 69 (13%) had received a primary course followed by a booster in the past five years; even when the criterion of a booster in the past 10 years was used only 116 were covered. Seventy patients, all born after January 1958, were uncertain whether they had received primary immunisation as children. Of these, 19 had received a booster in the past five years and may therefore have been adequately covered. The remaining 455 (84%) patients were not adequately covered (figure). The people with the lowest prevalence of immunisation were women aged 30-60. Of these, only 26 out of 160 (16%) had received a primary course compared with 193 of the 383 (50%) other patients.

Tetanus immunisation state of respondents to survey



Comment

Although this was a limited study, the results suggested that the adult population of this practice was poorly immunised against tetanus. There are, however, no national statistics for comparison. The response to the advice to attend for immunisation was poor: of 412 respondents who had not received a tetanus injection in the past five years, only 177 intended to make an appointment, and one month later only 37 had done so. This rate of uptake might be improved by giving advice and a leaflet at a consultation or at a health screening clinic. In our practice over 90% of patients found at a health screening clinic to need a course of immunisation against tetanus completed it. A more workable approach might be to target efforts at the most poorly immunised group—that is, women aged 30-60. This could be done when cervical smears are carried out at five year intervals by reviewing the tetanus immunisation state and offering vaccination if necessary.

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