*Letter from New Zealand***The New Zealand cervical cancer study: Could it happen again?**

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For one entire year in New Zealand a judicial inquiry has been under way into the treatment of carcinoma in situ of the cervix at the National Women's Hospital in Auckland. The National Women's is the teaching hospital for the Auckland University School of Medicine's department of obstetrics and gynaecology and the Postgraduate School of Obstetrics and Gynaecology. The inquiry was set up after a magazine article, entitled "An 'unfortunate experiment' at National Women's,"¹ alleged that an experimental research programme had been undertaken at the hospital entailing the study of the natural course of carcinoma in situ of the cervix by withholding conventional treatment from some patients. The authors of the article further alleged that an internal inquiry, set up after criticisms of the programme by two hospital doctors, had been a "white wash" and that there was no evidence that the research and the withholding of conventional treatment had ever formally ceased.

These allegations resulted in the setting up of a committee of inquiry led by one woman, Judge Silvia Cartwright. At the public hearings further claims were made. Among these were that vaginal smears had been taken from over 2000 new-born babies, as part of the same research, apparently without the knowledge or consent of their mothers; that a randomised controlled trial of treatment for invasive cervical cancer had been undertaken without the consent of patients; that groups of students had carried out vaginal examinations of anaesthetised women without their consent; and that postgraduate students had inserted and removed intrauterine devices on anaesthetised women before hysterectomy.

The public hearings started in August 1987 and continued until January 1988. The judge's report was released on 5 August 1988.² I served as one of the three medical advisers to Judge Cartwright. I believe that the ethical issues raised by the inquiry go beyond the specific difficulties in one institution to the underlying problem of accountability in medicine. Indeed, the study at the centre of the inquiry was widely known to gynaecologists beyond New Zealand; yet only one attempted to intervene.

The allegations

The investigations leading to the magazine publication were made by two feminists: one a journalist (Coney), the other an academic in the area of women's studies (Bunkle). The starting point for their investigation was the paper "The invasive potential of carcinoma in situ of the cervix," recording the apparent outcome of the study, written by McIndoe *et al* and published in 1984.¹ Two of the authors, McIndoe and McLean, were the doctors who had criticised the

programme in 1973. The authors reported on 948 patients with carcinoma in situ of the cervix diagnosed histologically between 1955 and 1976 who were followed for five to 28 years. One group of patients continued to produce abnormal cytological results consistent with cervical neoplasia after initial diagnosis or treatment. Among this group of 131 women, 29 (22%) subsequently developed invasive cancer of the cervix or vaginal vault. Among the other 817 women who had normal cytological results on follow up 12 (1.5%) developed invasive cancer.

Coney and Bunkle alleged in their article that these results were part of the findings in a study initiated by associate professor Herbert Green in the mid-1960s, which entailed following women with abnormal cytological findings after a diagnosis of carcinoma in situ. Some cases were diagnosed by colposcopically directed punch biopsy and the women were then offered no further treatment. Other women who had abnormal smears after cone biopsy or hysterectomy were alleged to have also received no further treatment. Coney and Bunkle claimed that there was no intention to cure these patients. The story of one woman, who had been a patient at the National Women's Hospital from 1964 to 1979, was outlined. This woman had a histological diagnosis of carcinoma in situ in 1964. "By the date of her discharge in 1979, Ruth had visited National Women's Hospital 34 times, she had had 28 cervical smears, five biopsies, four operations under GA, and 10 colposcopic examinations. But as the final histology clearly showed she still had cancer [carcinoma in situ]." In 1985 "Ruth" had returned to the National Women's Hospital with invasive cervical cancer.

Coney and Bunkle also described efforts by McIndoe and McLean to have this method of management reconsidered, leading to an internal hospital inquiry. They alleged that the report of that inquiry was termed a "white wash" by the then hospital superintendent. Further, Coney and Bunkle claimed that no one could give them an assurance that the study had ever ended. They quoted Professor Bonham, the professor of obstetrics and gynaecology, head of the postgraduate school, and chairman of the hospital ethics committee, as saying that the study "merged into general treatment. It stopped being a study and became general treatment." They also suggested that the views held at the National Women's Hospital had resulted in an attitude of neglect for cervical screening in New Zealand, and consequently a rise in the incidence of and mortality from cervical cancer in young women.

The judicial inquiry

The inquiry was set up by the Minister of Health at the request of the Auckland Hospital Board and in

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response to public concern about the allegations made in the magazine article. The Minister of Health directed Judge Cartwright to inquire into the specific allegations made in the magazine about the research programme and treatment of women with carcinoma in situ and also more generally into the procedures observed currently at the hospital for the approval and surveillance of research and treatment; into the information made available to patients; and into teaching about the treatment of carcinoma in situ and the value of cervical screening.

FINDINGS

Judge Cartwright found that a research programme into the natural course of carcinoma in situ of the genital tract had been approved in 1966 and that it had resulted in the failure to treat adequately several women with carcinoma in situ.² For a minority of women their management had resulted in persisting disease, the development of invasive cancer, and in some cases death. She found that additional reasons for the failure to treat adequately were the failure to stop the trial as soon as cogent evidence of risk began to emerge and the failure of some colleagues and administrators to impinge on clinical freedom and act decisively in the interests of the safety of patients.

The research programme had included the 1966 trial and the studies of vaginal cytology in the newborn and of the histology of fetal cervixes. The great majority of patients did not know that they were participants in the 1966 trial. The trial had been reviewed by the hospital medical committee in 1975, following expressions of concern, but had never formally been ended.

A review was undertaken for Judge Cartwright of the case notes of patients with carcinoma in situ treated at the hospital. Several women were recommended for further advice or treatment. The National Women's Hospital ethical committee procedures were found to be inadequate and to lack impartiality. The judge recommended that the ethical committee should be disbanded.

The recommendations to improve the protection of patients participating in research or treatment included the appointment of a patient advocate at the National Women's Hospital whose only duty would be to protect the patient to ensure that she received full information and the opportunity to consent to all procedures in which she might participate. In addition, the appointment of a health commissioner under the Human Rights Commission Act was also recommended to negotiate and mediate in complaints and grievances by patients and to heighten the understanding by health professionals of patients' rights.

Improvements in teaching by staff at the National Women's Hospital on the value of cervical screening were also recommended, as was the implementation of an organised screening programme for the whole country.

Ethical issues

Should a study of the natural history of carcinoma in situ of the genital tract, which entailed withholding generally accepted treatment from patients, have been approved by the hospital medical committee in 1966?

The hospital medical committee was empowered to make decisions about ethical matters relating to research and treatment. At the least the committee members might have been expected to consider the scientific basis of the proposal, to assess the inherent risks in comparison with the foreseeable benefits, and to consider the qualifications of the medical staff to undertake the study. These are basic principles included in the Declaration of Helsinki of 1964.⁴

The argument given in Green's publications for starting the study was that the invasive potential of carcinoma in situ was not proved. He argued that in the earlier studies of untreated carcinoma in situ, in which some cases had progressed to invasion, it had not been possible to rule out the presence of invasion at the outset.⁵ Other contemporary authors also considered this a difficulty.^{6,7} Green proposed to get around the problem by using colposcopy and colposcopically directed punch biopsies to exclude invasion at the outset. He was also confident that invasion had been excluded in those women whom he proposed to follow who had positive cytological results after either a hysterectomy or cone biopsy for carcinoma in situ.

The proposal presented by Green to the hospital management committee in 1966 stated: "It is considered that the time has come to diagnose and treat by lesser procedures than hitherto a selected group of patients with positive (A3-A5) smears. Including the four 1965 cases there are at present under clinical, colposcopic, and cytological observation eight patients who have not had a cone or ring biopsy. All of these continue to have positive smears at intervals. It is suggested that this should be extended to include all cases in women under the age of 35 with positive smears in which there is no clinical or colposcopic evidence of invasive cancer."⁸ The proposal also included a brief justification of the change in management. Green reported on the treatment of women before 1966: 503 women had been treated, 340 of them by cone biopsy or lesser procedure, and many had had persistently positive smears after initial management. He mentioned that one doubtful case was alleged to have progressed to invasion and stated that "one such case is approaching the expected incidence of invasive cervical cancer in any 500 women of this age group." He also justified the proposal on the apparent failure of screening to influence favourably the incidence of and mortality from invasive cervical cancer.

The written proposal did not include any information about earlier studies by other workers of untreated carcinoma in situ⁸⁻¹⁰ or about the indirect pathological and epidemiological evidence linking carcinoma in situ and invasive cancer. The crucial role of colposcopy was also not explained in the written proposal. There was an assessment of the risks from the early results of the study, which was clearly already in operation. This information, although reassuring, was incorrectly described. The denominator for the proportion progressing to invasion should have included only those women being followed who had positive smears—a figure not given in the proposal, but which was probably 32 from Green's paper.¹¹ The corresponding potential benefits of lesser surgical procedures were not mentioned.

At the senior medical staff meeting preceding the hospital management committee meeting the colposcopist, McIndoe, had tabled a memorandum and spoken against the proposal. (The tabling of this memorandum was disputed at the public hearings, but the judge in her report found as a fact that McIndoe had done this.) McIndoe had said: "in the present case inadequate tissue diagnosis, which can be the only description of the type of biopsy I at present perform (if this is to be the only biopsy done), and follow up only taking further steps if there is clinical or colposcopic evidence of invasion, would seem to me the type of care that should not be followed" (McIndoe's private papers, exhibit 75, cervical cancer inquiry).

On the basis of an assessment of hazard to the patient there are grounds for concluding that the project should not have been approved. Earlier similar studies had shown that there was a known risk to the patient of invasive cancer occurring.⁸⁻¹⁰ If Green was right and that risk arose because invasion had been missed at the

outset in other studies the ability of the colposcopist to rule out invasion with colposcopically directed punch biopsies was crucial. In fact, the newly trained colposcopist was not confident of having this ability; thus a second risk—that an invasive cancer might be overlooked—was added to the first, that an in situ cancer might progress to invasion.

Despite this conclusion, that the proposal represented hazards to the patients outweighing the benefits of lesser surgery, the hazards need not have been very great if the trial had been appropriately monitored and finished. The aim of the study, as stated in the minutes, was “to prove that CIS [carcinoma in situ] is not a premalignant disease” (exhibit 6, cervical cancer inquiry). Green had set up a study in which he had the opportunity to disprove his hypothesis. Should one case occur in which invasive cancer developed the hypothesis would be disproved, the study stopped, and the remaining patients treated. Should no cases develop invasion many women would be spared major surgery. Moreover, all the trouble, morbidity, and expense of screening and treating women could be abandoned in New Zealand and elsewhere. The importance of the objectives of the research might almost have been said to be in proportion to the risks.⁴

Should consent have been sought from the patients to be part of such a study?

It was suggested early in the inquiry by a medical ethicist, Alastair Campbell, who was called as an expert witness, that the balance of risks and benefits was the overriding consideration, more important than consent. Thus if the risks were regarded as unacceptable it would be inappropriate to seek the consent of patients; the research should not proceed (transcript of evidence, cervical cancer inquiry). Nevertheless, Beecher in his discussion of consent to clinical experimentation had stated that “the final decision as to the degree of acceptable risk belongs to the subject” and further “some studies bearing moderate risk may be entirely ethical when fully informed consent is obtained, but are otherwise unethical.”¹²

Clearly the subject can make this decision only if information on the risks of participation is presented accurately and fairly. If clinical research carrying moderate risk is to proceed it should do so only with the informed consent of the subject. The practice of seeking such consent to clinical experimentation was endorsed by the 1964 Helsinki declaration, which recommended that “if at all possible consistent with patient psychology, the doctor should obtain the patient’s freely given consent after the patient has been given a full explanation.”¹⁴ Consent to non-therapeutic research had already been regarded as essential, but the Helsinki declaration provided for exceptions where on occasion consent might not be sought for therapeutic research.

Some of those who have argued against universal informed consent for therapeutic experimental research have done so on the grounds that similar disclosure should obtain for a trial as for ordinary treatment. For example, Doll has written that “so long as physicians limit trials to situations in which they genuinely do not know what is the best way to treat patients, weighing potential risks against benefits, it is, I believe, frequently undesirable to be explicit about the nature of the trial, just as the doctor who is not carrying out a trial is normally not explicit about all the uncertainties associated with the treatment he prescribes.”¹³ Others have argued that full understanding before consent may be so difficult to secure that in certain cases there is no such thing as genuinely informed consent.¹⁴

But the situation described above by Doll does not apply to the circumstances at the National Women’s

Hospital. The National Women’s Hospital trial concerned women who had been screened by cervical cytology and referred by their general practitioners because of abnormal findings for the express purpose of treatment at the preinvasive stage. The trial did not entail two alternative treatments, but the withholding of treatment from some women. The implicit ethical undertaking when women had been offered screening was that there should be some benefit to them in detecting an abnormality.¹⁵ In addition, there were acknowledged risks of non-treatment potentially greater than those of treatment, so that the decision to allow a deviation from accepted treatment carried a responsibility to inform the patients that they were not being offered the generally accepted treatment, of the risks which this entailed, and of the alternatives available. I do not believe that whether the deviation had a research aim or not should alter this conclusion. Moreover, information about lack of treatment was absolutely vital for follow up. Some women were lost to follow up, apparently unaware that they had not been treated, and presented later with symptoms of invasive cancer.

Was the study monitored adequately?

I have argued that it was crucial to the safety of the patients that the trial should have been stopped as soon as the first cases of invasive cancer were found. Therefore monitoring the results of the study was vital. Even in recent years it has not been usual for ethics committees to monitor projects after they have been approved.¹⁶ Responsibility for monitoring studies has fallen to the individual investigators. Nevertheless, monitoring the results of clinical trials and determining in advance the criteria for stopping a trial have been recommended practice.¹⁷ The original proposal by Green did not spell out any criteria for terminating the trial. Nevertheless, his colleagues would have expected him to publish progress reports on his study as he had done before 1966. Such reports might have been expected to document any subsequent diagnoses of invasion. The publications up to and including 1970¹⁸⁻²¹ reported no further cases of progression to invasive cancer among women followed who had positive smears. Green’s next publication in 1974 reported six cases progressing to invasion out of 96 followed with positive cytological results for at least two years.²²

At this point, and indeed earlier, the trial had accomplished its aim. It had shown that carcinoma in situ in some cases was a premalignant disease; with no way of knowing which cases would become invasive all would need treatment. Green himself, however, drew a different conclusion at this time. He argued that the trial was not capable of disproving his hypothesis. In the 1974 paper he suggested that his earlier conclusion that “the risk of invasion in untreated or under-treated CIS [carcinoma in situ] was small and possibly much the same as in the total female population” was perhaps overstated not because of the occurrence of invasive cancers but “mainly because of the inability of present methods to exclude adequately invasive cancer at the outset.”²⁷ Hence Green concluded that at least some of the cases may have been missed invasive cancers. Although this cannot be ruled out as an explanation, it has no relevance to the risk to the patients. If it was not possible to be sure by limited biopsy at that time which cases were invasive then I believe that all should have been offered accepted treatment. Green seems never to have made this link in his reasoning. No comment was made in the paper to suggest that the trial had been ended.

At the National Women’s Hospital monitoring by the investigator failed. Nevertheless, the published papers made the results of the study available to academic and clinical colleagues. By 1974 Green

Underlying issues

SCIENCE

A supporter likened Green to Semmelweis, a great scientist who was pilloried by his uncomprehending colleagues (exhibit 63, cervical cancer inquiry). His professor described him as "a unique sort of free thinker."²¹ It is the notion of a scientist not only as an original thinker but as someone set apart whose activities cannot be understood that may have been responsible for the extent of the damage done at the National Women's Hospital.

That some of Green's colleagues failed to grasp the aim of the trial was evident at the public hearings. Two of his senior colleagues described the aim of the trial, not as "to prove that CIS [carcinoma in situ] is not a premalignant disease" as the minutes recorded, but as "to prove that CIS is not *invariably* a premalignant disease" (transcript of evidence, cervical cancer inquiry). That such an aim would have been unlikely and more hazardous—because testing it would have entailed following women until all developed invasive cancer—was pointed out by one of the expert witnesses. Not only was there misunderstanding or obfuscation about the aim of the trial: at the same time the view was put forward that there had been no trial but only an attempt to find the best treatment for carcinoma in situ.

A sense of inability to evaluate scientifically the results of the trial was conveyed by one of the members of the 1975 committee of inquiry at the recent public hearings. When asked why the committee had looked only at whether the 1966 proposal had been followed and not whether the proposal needed to be reappraised, he said that such a task would have required an investigation into the outcome for all patients and into the problems of pathological interpretation. "No member of the working party, in my opinion, had that sort of particular expertise in their background."

Interestingly, the doctors who felt able to evaluate and judge Green's work and even write it up for publication came from the non-academic staff. But the response of some other staff, including academics, to the paper was to misunderstand its conclusions. For instance, several staff who gave evidence at the public hearings, concluded from the paper by McIndoe *et al*³ that the rate of progression of carcinoma in situ to invasion, must lie between the rate for the untreated or partially treated group and the rate for the successfully treated group (transcript of evidence, cervical cancer inquiry). Furthermore, after publication of that paper no meetings had been organised to discuss the results and their implications for hospital practice. In a climate in which scientific issues are not openly discussed and yet scientists are given a special place, there is danger that the aberrant views of one individual may go unchallenged.

ACCOUNTABILITY

The Declaration of Geneva requires doctors to affirm that "I will practise my profession with conscience and dignity"; "the health of my patient will be my first consideration"; and "my colleagues will be my brothers."²⁴ To whom should doctors be accountable first: their own conscience, their patients, or their colleagues? A view implicit in much of the evidence at the public hearings was that a clear conscience would dictate that any doctor would act in the patient's best interests. The retired superintendent in chief of the Auckland Hospital Board emphasised: "This above all—to thine own self be true. And it must follow, as the night the day, thou canst not then be false to any man" (transcript of evidence, cervical cancer inquiry). There was even a reference in the minutes of the meeting at which the 1966 proposal had been approved to

Professor Green, "whose conscience is clear and who could therefore accept complete responsibility for whatever happens. . . ." (hospital medical committee minutes, exhibit 11, cervical cancer inquiry). But, as anyone familiar with *Hamlet* knows, Polonius's advice to Laertes is too facile a view of human nature. You may behave irrationally and yet have a clear conscience.

Of even more concern at the inquiry was that the dictum "my colleagues will be my brothers" had been taken too much to heart. The failure of the hospital and the university authorities to act appropriately after concerns had been raised in 1973 may best be understood as a failure to put the safety of patients before the reputation of colleagues. During the public hearings the notion of clinical freedom was used to defend the actions of colleagues; only illegal actions seemed beyond its scope (transcript of evidence, cervical cancer inquiry). Possibly the situation at the National Women's Hospital is no exception to the way that doctors usually behave. Friedson has argued that the service orientation of the medical profession has been promoted by doctors pursuing their claims for autonomy but that there was little empirical evidence to support this orientation.²⁵ Furthermore, he argued that if the profession fails to regulate itself according to that orientation, which ostensibly puts the patients first, and if the public sees that failure the profession risks losing its freedom from lay supervision and control. "The profession's privileged position is given by, not seized from, society, and it may be allowed to lapse or may even be taken away." Since Friedson published this opinion there has been a lot more talk about peer review and medical audit as ways of internally regulating the profession, but little evident action.

WOMEN

Complaints about the treatment of patients in hospital usually come from the patients themselves. In this case, however, it seems there were no such complaints. Undoubtedly this is partly accounted for by the symptomless nature of the initial condition, which had in most cases been detected by routine screening. The women could not gauge the effectiveness of treatment by monitoring their own symptoms in the usual way. Some women had complained to their general practitioners that they were going back repeatedly to the hospital and nothing seemed to be being done (transcript of evidence, cervical cancer inquiry). The general practitioners had been helpful and had referred the woman privately or even got in touch with Dr McIndoe, who had tried to help, but no woman or general practitioner had apparently made a formal complaint to the hospital.

Could men have been in exactly the same position? It seems to me likely that women were more vulnerable at that time to being included in a trial of treatment without their knowledge and consent and more likely to endure such a trial without making formal complaint. Women have been familiar with being patients in many aspects of reproductive function.

The 1960s probably saw the height of the medicalisation of childbirth. The extraordinary patience of women such as "Ruth," who returned to the hospital for an endless series of examinations and biopsies, was possibly conditioned by earlier years of antenatal clinic attendance. I suggest that women were vulnerable because they were used to submitting to medical checks without being told the exact purpose. I consider that they were also vulnerable because they were exposed to examination of the genital area by male doctors; in this situation the asymmetry of power between the doctor and the patient is exaggerated. Finally the sense of trust and good faith that most women had in the hospital and its staff also in my view

made women vulnerable. Those less trusting women were the ones who went back to their general practitioners and asked for treatment. The most trusting continued to attend. The revelations of the inquiry have damaged this trust and good faith not only in the National Women's Hospital but also elsewhere in New Zealand. Many doctors are extremely perturbed about the new lack of trust. Those doctors need to stop and think. The trust that existed has been shown not only to have been misplaced but to have been dangerous to the women concerned.

I have emphasised the special characteristics of women that might have made them vulnerable to worse treatment than men would have received. Others will point to the behaviour of doctors towards women patients. I suspect that some doctors have treated women with less regard for their autonomy than they have shown to men. But in this women may have shared the experience of men in other less powerful groups: the poor, the old, and the mentally ill.

Conclusions

I have given reasons for the judge's conclusions that the research proposal should probably not have been approved at the outset; that consent should have been sought from the patients; that the study was not monitored adequately; and that the concerns of other doctors were not acted on. Furthermore, I have argued that the reasons for this failure to protect the safety of patients went beyond the individual researcher and needed to be sought in the attitudes of doctors to science, to accountability, and perhaps to women. How might these broader concerns be addressed?

Firstly, we need to be able to understand the work of clinical scientists. Their colleagues must first understand what they are proposing if there is to be any hope that patients may later be sufficiently informed to decide whether to take part in research. For this there must be more emphasis on the science of medical practice. Studies of the outcome of treatment require applying scientific methods not to how the body works but to how well clinical practice works. For this it is essential to move from the perspective of the individual patient to that of groups or populations. Roberts has suggested that such epidemiological methods need to be understood and used by clinicians: "it is largely through epidemiology that the physician can satisfy the requirements of contemporary society, which expects him to be scientific (as distinct from technically competent) about what he is doing compared with formerly when society was satisfied that he was scientific about what he was looking at."²⁶

The public's scepticism and distrust of the scientist and the researcher in medicine may be due to an overemphasis on understanding mechanisms and on developing new technology and to a neglect for evaluating the outcome of treatments. The emphasis needs to be shifted. Paradoxically, New Zealand medical scientists are concerned that publicity about the study at the National Women's Hospital may make research more difficult to undertake because of public distrust or bureaucratic overregulation. I believe distrust will be an unavoidable consequence of the inquiry, but it would be folly to blame the publicity itself and not the real problems it disclosed.

Will the interests of patients be safeguarded in future by the profession reasserting its commitment to medical audit? The debate seems to have reached an impasse. The reason given by the profession for medical audit is almost always as a means to satisfy the public in order to ward off "regulation from outside the profession that will severely curtail our clinical freedom."²⁷ If there are real reasons why the public wants to curtail clinical freedom—and this inquiry

suggests that there are—the profession should be as concerned as the public. Would a truly service orientation result in such reluctance to form an alliance with the public to improve the safeguards for patients? The profession is already losing some of its autonomy from lay supervision and control in New Zealand, as was shown by the establishment of a committee of one lay person to inquire into the National Women's Hospital allegations.

There are dangers in control by the laity: an overemphasis on the easily quantifiable, especially cost; unfamiliarity with the technical and scientific aspects of medicine; and ignorance of the uncertainties on which clinical judgment is often based. Surely some of these difficulties could be overcome by bringing the public and the profession closer together? The public needs to understand that mistakes are common in medicine, and are often inevitable. McIntyre and Popper have called for a new ethics to allow the profession to acknowledge and deal with error.²⁸ They recommend a new critical attitude in medicine—to one's own work and to that of others. But this requires tolerance; "in the search for mistakes there should be no denigration of others." Condemnation would then be properly reserved for those who sought to cover up error.

Inevitably, new consent procedures will be recommended, especially for patients concerned in research and teaching. In the past the principal safeguard for the patient has been the integrity and good faith of the doctor. When that good faith is brought into question at the highest levels in the hospital there must be recourse to other mechanisms to protect the patient. Patients will welcome more information and a greater chance to make informed decisions about their treatments, but I suspect that both doctors and patients will continue to worry about the lack of trust. People who are ill need to be able to trust their medical advisers, but that trust is not bestowed with a higher degree; if it has been abused it will need to be earned again.

It is tempting to imagine that the increasing proportion of women in medicine will change professional attitudes. Women gynaecologists have the advantage that they are familiar with some of the experiences of their women patients. But I know no reason to believe that women are not otherwise as fallible as men in every aspect of medical practice.

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Lesson of the Week

Brain abscess complicating cervical traction

A T Reece, N V Todd

Skull tongs and callipers that lack a mechanism for limiting depth of penetration of bone are associated with a definite risk of brain abscess and should be abandoned

Patients with a diagnosis of fracture-dislocation of the cervical spine must have their fracture immobilised immediately. Traction can be applied with skull tongs and various types are used. We report two cases of brain abscess complicating the use of Cones callipers.

Case reports

Case 1—A 66 year old man sustained a fracture-dislocation of C4-5, which was treated orthopaedically by traction for seven weeks with the use of Cones callipers. Five months later a right temporal osteomyelitis developed and sequestrectomy was performed under local anaesthesia. Seven months after that procedure the patient was admitted to the regional neurosurgery unit with headache, drowsiness, left hemiparesis, and a fever of 38.5°C. Computed tomography (CT) showed multiple abscesses in the right temporal lobe; the neck was stable. The abscesses were excised at craniotomy. Culture disclosed a heavy growth of *Staphylococcus aureus*, and benzylpenicillin and chloramphenicol were started. The hemiparesis resolved by the second postoperative day.

Case 2—A 52 year old man suffered a fracture-dislocation of C6-7. This was treated by skull traction with use of Cones callipers. Three weeks later he began to have focal seizures affecting the face and arm and increasing drowsiness. Radiographs and CT of the cervical spine showed the fracture to be stable, and CT in the regional neurosurgery unit disclosed an abscess in the right temporal lobe. This was drained through a small craniectomy, and culture grew *Staph aureus*. Chloramphenicol and benzylpenicillin were given, and by the 10th postoperative day the patient was alert and had minimal drift of the left arm.

Discussion

Brain abscess has been reported in 13 patients treated with skull tongs¹⁻⁴ and two treated with halo fixators.⁵ The diagnosis may not be obvious and a high level of suspicion is required; five of the 13 patients quoted above died. The abscess may be preceded by local osteomyelitis of the skull, for which limited sequestrectomy or antibiotics, or both, are rarely adequate.

All the reported cases of brain abscess occurred after the use of tongs that lacked a mechanism for limiting the depth of penetration into the skull. In 12 of the 13 cases there was a definite breach in the inner table. In six, however, the dura was found to be intact at exploration, suggesting that penetration of bone was the relevant factor. There have been no cases of abscess reported after the use of Gardner-Wells tongs, which have a spring loaded mechanism that prevents penetration of the inner table of the skull (table). Cones callipers lack this mechanism. They and similar types of skull tongs should no longer be used.

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- 1 Harris P, Win PHT. The management of patients with injury of the cervical spine using Blackburn skull calipers and the Stryker turning frame. *Paraplegia* 1975;2:278-87.
- 2 Jamieson KG, Yelland JDN. Cerebral abscess due to skull traction. *Aust NZ J Surg* 1965;34:301-2.
- 3 Weist H. Unusual complications of skull caliper traction. *J Bone Joint Surg [Br]* 1972;54:143-5.
- 4 Hall JC, Burke OC. Brain abscess following the insertion of skull tongs. *Paraplegia* 1979;17:278-9.
- 5 Dennis GC, Clifton GL. Brain abscess as a complication of halo fixation. *Neurosurgery* 1982;10:760-1.

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Mechanisms of skull tongs in common use and list of those that should be abandoned

Type of tongs	Mechanism	Comments	Recommended for use
Gardner-Wells	Spring loaded, 13.6 kg pressure	Does not penetrate inner table of skull	Yes
Cones callipers	Screw thread	Tightened by hand; no limit to depth of penetration	
Ice tongs	Tong inserted into twist drill hole	Inner table may be penetrated by twist drill or subsequent tightening of tongs	
Crutchfield tongs	Tong inserted into standard burr hole	Dura always exposed	No
Blackburn callipers	Tong inserted into standard burr hole		

Risk of infection of central nervous system is present when dura is exposed, greatest when dura is penetrated.

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