

# NEWS LETTER

THE SCOTTISH SOCIETY

OF

ANAESTHETISTS

*Founded*  
20th February, 1914

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No. 18

# THE SCOTTISH SOCIETY OF ANAESTHETISTS

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## OFFICE BEARERS 1977-1978

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| <i>President</i>      | Dr. J.I.M. LAWSON, Dundee.  |
| <i>Past President</i> | Dr. D. BEATON, Stirling.  |
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## REGIONAL REPRESENTATIVES ON EXECUTIVE COUNCIL

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| Glasgow                     | Dr. D.J.M. FERGUSON   | Retires 1979 |
|                             | Dr. A.A. SPENCE   | Retires 1980 |
| Edinburgh                   | Dr. N.M. SMITH  | Retires 1978 |
|                             | Dr. R. BURTLES  | Retires 1979 |
| Dundee                      | Dr. I. GRAY   | Retires 1980 |
| Aberdeen                    | Dr. I. SMITH  | Retires 1978 |
| Inverness and The North     | Dr. J.H. SPENCELY   | Retires 1980 |
| Editor of the<br>Newsletter | Dr. D.F. STEEL,<br>Division of Anaesthetics,<br>Royal Alexandra Infirmary,<br>Paisley, PA2 6LX. |              |

"The objects of the Society will be to further the study of the science and practice of anaesthetics and the proper teaching thereof, and to conserve and advance the interests of anaesthetists."

"Ordinary membership will be restricted to members of the medical profession practising the specialty of anaesthetics."

— Extracts from the Constitution.

**Subscription**  
£1.00 per annum.

# Programme for 1978

**REGISTRAR'S PRIZE:** Entries to be submitted to the Secretary by the 28th February, 1978.

**ANNUAL GENERAL MEETING:** Post House, Aviemore, 28th/30th April, 1978.

**REGISTRARS' MEETING:** Western General Hospital, Edinburgh, May, 1978.

**SCIENTIFIC MEETING:** Ninewells Hospital, Dundee. Date around November to be arranged.

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## Registrar's Prize

The Society awards annually a prize of £60 for the best original paper submitted by an anaesthetist in Scotland, holding the grade of Senior Registrar or under. A second prize of £30 or a third of £10 may be awarded for other papers of particular merit at the discretion of the assessors. It is not necessary that the Registrar be a member of the Society.

The conditions attaching to the award are as follows:—

1. The paper must be original, i.e., it should not have been read previously at any meeting or published in any journal. The winning of the prize is in no way a bar to the subsequent publication of the paper.

2. It is desirable that papers submitted show evidence of personal work, but papers consisting of surveys of the literature are eligible for consideration. The Council of the Society wishes to stress that intending competitors should not be discouraged through fear of their efforts being judged elementary. It is fully realised that junior anaesthetists in some peripheral hospitals may not have opportunities to deal with special types of

cases or to employ advanced anaesthetic techniques.

3. Papers for adjudication *must* reach the Secretary by the *end of February* at the latest.

4. The winner of the prize will be required to give a digest of the paper at the Annual General Meeting of the Society towards the end of April.

The Secretary places all entries in the hands of the Award Committee which consists of the President, Vice-President and Past President. The members of this Committee have expressed the desire to be able to adjudicate without knowing the name or hospital of the writer: it is requested therefore that the name, address, etc., of the entrant be submitted on a separate covering page. This will be retained by the Secretary, but otherwise the essay itself should give no indication as to its source: acknowledgment to colleagues, etc., should not be included.

The prize for 1977 was won by Dr. Brian H. Maule of the Royal Infirmary, Glasgow, for his paper entitled "The Swan-Ganz Catheter in a Respiratory Intensive Care Unit".

## President's Newsletter

In these troubled times it is particularly pleasing to open with news which will be enthusiastically welcomed by every member of the Society. The Gillies family have indicated that they would like to endow a lectureship in honour of the late Dr. and Mrs. John Gillies. After a meeting in Edinburgh in September with Drs. Deidre and Iain Gillies, themselves both anaesthetists, plans are well advanced, and it is possible that the first Gillies lecture will be given at the next Scientific Meeting. In order to reflect Dr. Gillies' interest in the young anaesthetist and his special concern for safe clinical anaesthesia, it is intended that so far as is possible the lectures should be related to these themes.

The date of the Scientific Meeting has been changed to November, the day probably being a Friday. Although this obviates the counter-attraction of a summer Saturday and separates it more from the A.G.M., almost inevitably another problem is raised — proximity to the Registrars' Meeting; this may therefore be moved after 1978 to early summer. The Scientific Meeting will now be an all day occasion, with a lunch replacing the dinner. Other items discussed by Council include the possibility of a foreign visit in 1979 to a country (e.g. Czechoslovakia) still accessible to relatively impoverished Scottish anaesthetists, and the reporting of deaths associated with anaesthesia. A subcommittee has been formed to look into the latter and it was decided at its first meeting on November 6th to begin by making an informal approach to the legal authorities. Arrangements for the Annual General Meeting have also been reviewed. The practice of holding a Council meeting the same morning leaves little time for discussion at the A.G.M. itself and it is proposed, therefore, that Council should meet a week beforehand.

Other matters of topical interest to Scottish anaesthetists are "epidural top-ups" by midwives (an established practice in England) and training in dental anaesthesia. It is hoped that by the time this is in print a pilot study will be under way in Edinburgh and Dundee. If it comes to fruition, the development will be welcomed by hard-worked junior anaesthetists doing their obstetric rotation and the rest of us will surely see no objection, as



long as it is not made an excuse to institute obstetric epidural analgesia without adequate medical cover. A working party of the British Dental Association and the Faculty of Anaesthetists has been considering training for doctors and dentists (in England and Wales) who give "dental chair" anaesthetics. It is a paradox that, whereas any anaesthetic department will allot only experienced staff to dental lists, similar cases in private surgeries are so often handled by relatively untrained practitioners and the working party is attempting to define a realistic and practicable system of instruction for them. Many anaesthetists, however, will be uneasy about officially enshrining a grade of sub-specialist and of risking the perpetuation of a technique which depends too much on special expertise of anaesthetist and operator and on a patient easy to anaesthetise; even in these circumstances guarantees of safety and adequate operating time

are often deficient by present-day standards. More positive encouragement of local analgesia from undergraduate tuition onwards could substantially mitigate the problem; it would take time, but at least we should be sure of being on the right road.

The President is in a particularly advantageous

position from which to see how much the smooth functioning of the Society depends upon the hard work of the Secretary, Treasurer and Editor. Our thanks are due to them and also to the other Council members for their valuable contribution to our affairs.

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## Annual General Meeting – Aviemore

29th APRIL – 1st MAY, 1977

Our continued association with The Post House, Aviemore, has once more been crowned with success even more members than before attended our meeting this year and we were pleased to see many younger members of the Society present with their families, a hopeful sign that the Society can look to a prosperous future. The actual Annual General Meeting was well attended as was the academic programme in the afternoon. The papers read at this session are published in the Newsletter.

In a lighter vein the sporting activities were well supported, more golfers taking advantage of Boat of Garten Golf Club's generosity. This year the mens prize was carried to the east after a long spell in the west, by Dr. Alistair Masson. However, the ladies trophy remains in the west, with Dr Isobel Kirkwood this year.

The curling this year was a purely feminine pursuit, whereas two of our members provided their own breakfasts after a successful fishing trip

to Lochindorb.

Several members enjoyed a somewhat rushed visit to the Eden Court Theatre, Inverness, to see an excellent production of "Arsenic and Old Lace" with Barbara Mullen.

A word of congratulation is due to our guests, Professor Andrew Thornton and his wife who showed great fortitude in the face of overwhelming photography as they were photographed with each member at the reception, and also to our President Dr Ian Lawson and his wife for undergoing the same ordeal, followed by the task of dancing with innumerable aspiring members of between 15 and 8 years old!

Finally the usual request is made that you apply early to The Post House, Aviemore, to ensure that space is available, and also that those wishing to attend, reply early to the Secretary to assist with the organisation. Your council looks forward to seeing as many as possible again at Aviemore on April 28th – 30th, 1978.



# Presidential Address...

Dr. J.I.M. LAWSON

## FROM SAN DIEGO TO NINEWELLS

To be invited to be President of this Society is a great honour, but there are worries too, and the greatest of these is the Presidential Address. I have cast my net widely in the hope of interesting all of you at least some of the time. In this I have been fortunate in that the last decade of my professional life has been eventful. It begins with a year in San Deigo; I decided to include it as it was an unusual 12 months and forms a prologue to subsequent events.

In 1966 San Deigo County Hospital was taken over by the University of California to form the nucleus of a new medical school. The anaesthesiologist in charge remained in post meantime but there was no prospect of his continuing as chief under the University, which intended to establish a Chair of Anaesthesia. This Chair was, however, to be in the Department of Surgery, an arrangement which the American Anaesthetic establishment understandably resented. Relations between the senior anaesthesiologist and the Chairman of Surgery soon became strained, and towards the end of 1967 the former resigned. Brian Smith of Birmingham had arrived in October 1967 to spend a Sabbatical year in San Diego and found himself having to take over as acting chief of Anaesthesia.

The anaesthetic staff now consisted of Brian Smith, 2 other anaesthesiologists and 7 nurse anaesthetists. As work in the Department of Surgery built up with a rapidity typical of the States, they soon felt short staffed. No help could be expected from the San Diego anaesthesiologists, and there was also difficulty on a national scale in filling the Chair because of the disapproval of the American Society of Anesthesiologists of its subordinate position. The immediate problem was to maintain a clinical anaesthetic service without which the surgical programme would founder, with disastrous implications for the new medical school. The Chairman, through Brian Smith, sought help in the U.K. Smith had known the late Harvey Franks in Dundee, and he arranged that William Bisset, a senior registrar, should fly out in

February 1968. When Brian Smith's year finished the following October, I went as his replacement as Acting Chief of Anaesthesia and was given the post of Associate Professor of Surgery (Anesthesia). I had been appraised of the difficulties before I left but, coming from a country free of such problems, I had little idea of the bitterness which had been aroused. This became clear on my first meeting with the Chairman of Surgery, who emphasized that the proposed structure represented unalterable University policy, and warned me not to become involved.

Local anaesthesiologists visited me to lobby their views; they showed no personal resentment but made it clear that they would use their influence to ensure that no further foreign anaesthesiologist would be granted a licence to practise in University Hospital until the dispute was settled. They expected the surgical service to founder when Bisset returned home in February 1969. I felt almost guilty about my position, and, like Brian Smith before him, naively lobbied the Vice-Chancellor of the Medical School to press the case for an independent department. My approaches had no apparent effect. People do not like to be told their business by strangers, and none less so than Americans. In retrospect I find it curious how deeply involved we became with local problems despite knowing that we were staying for only a year.

The San Deigo anaesthesiologists were as good as their word and when Bisset left there was no replacement. This left 3 anaesthesiologists in a growing Department of Surgery, one of whom was too old to do call leaving two of us to cover the nights. Call was more tiring than arduous, as most of the emergencies were done by the nurses. I had decided to approach nurse anaesthesia without prepacked prejudice and soon realised that it was better than I had expected. Good nurse anaesthetists had the technique to manage most cases, providing they worked to a strict protocol, backed by the American system of constant

monitoring. In San Diego it was grafted on to British methods of general anaesthesia in which Smith and Bisset had given them excellent training. New arrivals, however, tended to be of poor standard, having worked for too long without contact with anaesthesiologists, and they had to be retrained. Over six months in 1969 nurse anaesthetists in University Hospital gave 76 per cent of all anaesthetics and 95 per cent of emergencies. The system functioned satisfactorily during normal hours, allowing us to supervise a suite of 6 theatres. Overnight, however, serious problems could arise if we were not called in when the only help the nurses had was surgical residents and interns doing their Anaesthesia rotation. Then the surgeon, often junior assumed responsibility for the total management of the case.

Nurse anaesthesia is likely to remain widespread in the U.S.A. for many years. Figures published in 1965 indicated that 46% of anaesthetics were given by them. The first nurse anaesthetists were nuns. In 1877 Sister Mary Barnard entered St. Vincent's Hospital in Erie, Pennsylvania, to train as an anaesthetist. In 1889 the Sisters of St. Francis in Rochester, Minnesota, opened St Mary's Hospital, in which the 3 surgeons were the Mayo brothers, and it was in this hospital later to become the Mayo Clinic, that nurse anaesthesia became established. During the 1914-18 war they taught British nurses to give anaesthetics in the field. Despite their uses, there was no doubt in my mind that their very existence tended to degrade medical anaesthesia, and it is impossible to escape the conclusion that "the struggle for status" of Anaesthesia in the U.S.A. has not been helped by their presence; most American anaesthesiologists disapprove of them, particularly when working unsupervised (1). The system might be justified if a physician anaesthetist took full responsibility for all anaesthetics but possibilities of abuse abound, the more so these days with pressure growing to extend the activities of paramedical personnel. We are fortunate in that we do not have the problem of the nurse anaesthetist in the U.K., but we do have dental anaesthesia, which this afternoon I am happy to leave to our distinguished guest.

My only contact with dental anaesthesia during the year was pleasant. I visited the late Neils Jorgensen at Loma Linda, 100 miles-north of San Diego. He told me that when in 1953 he introduced his intravenous sedation technique of

pentobarbitone, pethidine and hyoscine (2), to treat spastic patients under local analgesia, he received no requests for reprints and was surprised to hear that the technique was so widely known in the U.K.

My duties were administrative, clinical and teaching. I inherited a competent secretary, who kept me right until I had familiarised myself with departmental and hospital organisation, and I was fortunate in having Bisset already there to show me the clinical protocol. No allowance was made for the fact that I was a stranger; with no introduction I was expected to perform competently from the first day.

The patients came from 3 sources — Welfare, University Teaching Funds (e.g. particularly interesting cases imported from Tijuana) and private. The first two groups provided opportunity for junior staff experience, and for research but they did in the end receive reasonable treatment. Private cases were operated upon by University staff with the University receiving fees and also by visiting surgeons who had an honorary University attachment. The attitude of the patients was disconcerting; suspicion was often more in evidence than trust, with little evidence of warmth or humour — though I must not forget the old Indian, who, before her craniotomy, remarked that this must be one of the few occasions when a white man was to scalp an Indian.

Many patients were exceedingly decrepit with grotesque disease processes, and operations took a long time, necessitating intensive monitoring — 5-minute pulse and blood pressure, ECG, CVP, urine output and fluid balance on any major case, and often body temperature. Record-keeping was equally comprehensive. This approach no doubt benefitted patients and was valuable from the teaching point of view. Much was being learned from Vietnam, but intensive care was often overdone with an unwillingness to compromise, resulting in hopeless cases having little chance to die in peace. A disinclination to use adequate doses of opiates also increased distress unnecessarily, and we were too often reminded that there are opportunities in medical practice for cruelty as well as kindness.

Our own anaesthetic techniques could not escape American influence. Surgeons did not show the uncritical acceptance of general anaesthesia to which we are accustomed in the U.K. Their

attitude was a reflection not only of the varying standards of general anaesthesia in the States, but also of a traditional bias towards regional analgesia – the two factors being inter-related. An example was provided by the urologist who, not wishing his candidate for renal transplant to be connected to what he regarded as a germ-ridden ventilator, insisted on continuous epidural analgesia. Some were well acquainted with matters generally regarded as the prerogative of the anaesthetist, e.g., the thoracic surgeon had written a paper on the performance of ventilators. This interest in anaesthetic and para-anaesthetic matters was to us a constant stimulus to justify our techniques – to borrow Kissinger's observation to the press, "You have irritated me greatly but you have sharpened my wits". Spinal analgesia was widely used. Anaesthetists in Scotland had escaped the full force of the reaction in England against it in consequence of the *Roe v Ministry of Health* case in 1954, and we easily embraced its extended practice, becoming even more convinced of the safety of this precise and elegant technique. It has been said that the mistakes of general anaesthesia are buried, while those of spinals are left to sue us, but surely it is comforting to think that the widespread employment of spinals would not continue in malpractice-conscious America if sequelae were such a problem. I often recall advice given by Dripps on a visit to Edinburgh many years ago concerning the importance of meticulous and gentle technique (which I am sure is equally applicable to epidural analgesia).

There was little opportunity for research, but I became involved in an interesting project with Nina Braunwald, Associate Professor of Cardiac Surgery. With her husband, Eugene, the cardiologist, she had devised a carotid sinus nerve stimulator for the treatment of intractable angina (3). The rationale of the system was that stimulation of the carotid sinus nerves leads to a reflex vagal discharge and reduction of sympathetic outflow, thus reducing myocardial oxygen requirements. Electrodes were placed in the neck and connected to a radiofrequency receiving unit implanted in the chest which the patient could activate by an external transmitting unit, thus aborting an anginal attack.

There were no Anaesthetic junior staff, in the absence as yet of an academic department. Surgical interns and residents rotated through our

unit as part of their surgical training – many would find themselves having to supervise nurse anaesthetists in future. They never anaesthetised alone, and during emergency hours helped the nurses when their theoretical knowledge was a useful complement to the nurses' technical competence. Teaching received the highest priority and unlike conditions in the NHS with its comprehensive service commitment, there was little conflict between training and having to get through heavy operating lists. The young doctors' insistence on being taught was a constant stimulus.

As the year progressed a number of distinguished anaesthesiologists visited the Hospital, and finally Henrik Bendixen accepted the Chair. It could be argued that he was sufficiently distinguished not to be bothered by the University's terms and his reputation defused the local anaesthesiologists' opposition to the status of the post, but a convoluted compromise had been devised, in that he was appointed Head of the Department of Anaesthesia at University Hospital and of the Division of Anaesthesia in the Department of Surgery in the School of Medicine.

What I had enjoyed in San Diego was the interesting work, the buoyant sensation of progress, and the efficiency of a competitive society. Many of the nicest people in the world are Americans but in California there was a hardness to life, reflected in many of the senior doctors who saw nothing incongruous in remarks such as, "I want a good anaesthetist tomorrow because I have a private patient"; and by the nearby private clinic diverting desperately ill patients unable to pay for treatment to our hospital with its welfare commitment. It was uncomfortable to live with the ethic, originating, according to Alistair Cooke, with the Pilgrim Fathers which tends to regard misfortune as something to be ashamed of, even one's own fault. On the other hand, as we motored for hundreds of miles over boulder-strewn mountains and desert to Tucson in Southern Arizona and thought of the pioneers struggling west over the same inhospitable ground, we began to understand why the Californian is little inclined to share his success with those he feels have not earned it.

As Britishers, we felt the lack of European history in the environment. This made us appreciate all the more what evidence there was of early European influence in this part of America.



The southwest of the USA was colonised from the south by the Spanish who set up the first European government in North America at Santa Fe in 1610, ten years before the landing of the Pilgrim Fathers. An early epic of this colonisation was Coronado's great march from Mexico City to Nebraska and back in 1540-42. On this journey Coronado noted in what is now New Mexico, Acoma, an Indian settlement, situated on a plateau above the desert. It remained unconquered for half a century, and then became the site of an appalling massacre by the Spaniards in defiance of the Pope's proclamation about the humanitarian rights of the Indian. This was the sort of conduct which had led an Indian in South America to refuse to become a Christian before being burned in case he went to heaven and met Christians there.

As the Spaniards colonised the region, the conquerors became ranchers, and their settlements were marked by missions which set out to convert the Indians to Christianity, and to farm the land: San Deigo was founded thus in 1769. By the beginning of the 19th century the missions had great power and wealth, but this was soon to disappear with secularisation which followed a period of political instability: in 1822 Mexico declared independence from Spain, in 1846 California set up the Bear Flag Republic in defiance of Mexican authority and in 1848 the conclusion of the war between the USA and Mexico resulted in California being ceded to the USA. The discovery of gold in the same year stimulated immigration from the East of the United States. The original missions were constructed of adobe and are now crumbling ruins, but many were rebuilt of stone and are still in use today.

When I returned to Dundee in September 1969 interest in obstetric epidural analgesia was growing, stimulated by the work of Moir and Willocks (4). I was well placed to introduce the method as I had used epidurals in gynaecology lists since 1960, but it was not possible to provide a complete service with the number of staff in our Department. I started on a selective basis, doing most of the epidurals myself, and relying predominantly on obstetric staff for the "top-ups". The service gradually developed as establishment increased and junior staff became progressively more involved in the Maternity Department, until in September 1974, nearly 2 years after the

opening of Ninewells, a complete obstetric anaesthetic service was achieved under the charge of Melville Milne; its development is summarised in table 1. We cannot yet provide a 24 hour on / 24 hour off rota, but we try to give the Maternity resident an easy time the next day. The junior staff accept this; their only complaint is about "top-ups", concerning which we hope that the Scottish midwives will soon follow the example of their colleagues in England.

Training is done during gynaecology lists where most major cases receive epidurals. Patients accept them if they are assured that they will be asleep during their operation — when teaching I prefer them to be unaware of having the epidural performed. Even so there are occasional difficulties. No gossip parlour can equal a gynaecology ward, where there are always some women who take a malicious pleasure in worrying those awaiting operation; although their favourite ploy is to associate epidurals with being conscious during surgery, even paralysis may be mentioned. A genuine problem is the occasional headache following inadvertent dural tap with a 16 gauge needle. Doughty regards this complication as resulting from negligence. It is a good philosophy, but the occasional lumbar puncture is inevitable in the course of teaching. We do not favour active treatment with epidural drips or blood patches, which may bring their own troubles. A problem with conservative management, however, is that it is difficult to impress upon ward staff how strict it should be, with the result that a headache often drags on longer than is necessary. There is still some prejudice against epidural and spinal analgesia in this country which can lead to such incidents exciting a disproportionate amount of comment compared with that aroused after more serious incidents occurring during general anaesthesia. Junior staff start work in the Maternity Department when they are technically competent. That the training policy pays off is indicated by a reasonably acceptable dural tap rate (Table 1). We find that nearly every anaesthetist has to do at least one, apparently to "learn the lesson", but that an occasional individual does more.

We have long favoured epidural analgesia for Caesarean section, feeling that it is wrong to expose patients to general anaesthesia when they have a satisfactory epidural in situ. Most women

can be persuaded to remain awake for Caesarean delivery. Success often depends upon the enthusiasm of an individual anaesthetist and his/her ability to inspire trust in the patient. The best premedicants are kindness and the instillation of confidence, which can, where necessary, be fortified after delivery by intravenous sedation. Otherwise, main difficulties are fall of blood pressure and nausea. Hypotension, defined as a systolic blood pressure under 90mmHg, occurred in 18% of emergency sections and in 27% of elective cases. Its risks are minimised by lateral tilt, use of the Arteriosonde and, if necessary, by intravenous ephedrine. Nausea and vomiting can be a nuisance, but their incidence is significantly lessened by using syntocin rather than ergometrine. Gentle operating technique is essential, and must contribute to the patients' seemingly exceptionally good post-operative condition. The delight in the method is the manner in which everyone in theatre co-operates, with the patient the "centre of the stage". Between 1970 and 1976 we did 274 elective and 616 emergency epidural sections (Table 2).

No provision for an Intensive Therapy Unit had been made in the original plans for Ninewells Hospital. Over the years numerous representations had sunk without trace in administrative swamps, and the affair was further complicated by the legal wrangles which so bedevilled the building of the hospital and inhibited the Board from making any major alteration to the original plans.

The arrival of a new medical administrator gave us our opportunity. He was an enlightened man who had the ability to knock the heads together of various interested parties, and it was not difficult to convince him of the necessity for an I.T.U. in the new hospital. An interim 4-bedded unit was established, while plans for a permanent one were formulated (it is now built). That we would be in charge was not certain. We had been little involved in the only previous unit in Dundee — more an intensive nursing area, under an excellent physician who was also moving to Ninewells. Physicians are not to be under-rated; they carry much influence with administration; but we had the support of the surgeons, and we, as anaesthetists have over years of struggling for our rights learned to fight for our achievements. To make it easier for the physicians to accept the

arrangement, we followed the example of the Royal Infirmary, Edinburgh, and named the area, the "A.V.U." — Artificial Ventilation Unit. Ian Gray set it up and has since been joined by two additional consultants, David Dalrymple and Farquhar Hamilton. The increase in junior staff establishment which accompanied the commissioning of Ninewells allowed us to provide the essential resident anaesthetic cover on a 24 hour on / 24 hour off basis. Pre-registration surgical J.H.O.s now rotate through the unit on a supernumary basis and the attachment of a senior registrar in Respiratory Medicine consolidates relationships with the physicians. Ian Ledingham emphasises the importance of the inter-disciplinary philosophy of I.T.U.s; otherwise other specialties, who actually provide the patients, miss the experience of treating much acute illness: and we learn much from them.

The unit is mostly surgical, often acting as a long-term recovery ward, and not every patient needs ventilation, e.g., panproctocolectomies on continuous extradural analgesia are conveniently nursed there. Where prolonged respiratory support is required, it has an Area function, receiving patients also from Perth and North Angus Districts. Patients with major abdominal and thoracic injuries are transferred also from Dundee Royal Infirmary, which, as a result of poor planning in the past is our accident hospital. It is however fair to say that such transfers can be accomplished with surprising ease — in under 5 minutes, say the ambulance men, if there is no police escort!

I.T.U.s do not have to be managed by anaesthetists, but our background of having to collaborate harmoniously with colleagues makes us particularly adept at co-ordinating inter-disciplinary treatment, and the skills which we have learnt in the operating theatre form a uniquely suitable basis for the clinical care contributed by us. The prestige of Anaesthesia in the UK owes much to our association with I.T.U.s, where anaesthetists meet surgeons and physicians on their own ground of treating disease. But in 1969 Mushin and Lunn (5) cautioned anaesthetists about becoming too involved in the management of I.T.U.s to the neglect of their more generally accepted and time-honoured duties; if they did, both the community and the advancement of the specialty would suffer. Certainly I.T.U.s should be

seen in their proper perspective and their well-deserved prestige should not obscure the fact that there is no more important and responsible part of our work than in the operating theatre. A death resulting from a mistake in intensive therapy hurts our pride; from an anaesthetic it is shattering.

Our real introduction to intensive therapy dates back to 1961 when open-heart surgery was started in Dundee. This is now only history — sad in a way for us but good for patients to have this work concentrated in fewer centres. But it left another legacy which bore fruit in Ninewells Hospital — an interest in monitoring with the result that a centralised system was built into the Main Theatre Suite. In the base of each operating table in the six theatres are eight input sockets which convey signals from patient sensors to four monitoring laboratories above. These are connected to a display panel in each theatre, displaying systolic and diastolic blood pressures, central venous pressure, heart rate and body temperature. There is a four-channel oscilloscope and ECG may be written out. Signals are amplified and recorded on an eight-channel recording system which is shared between two theatres; hence four channels are available for each theatre, with the possibility of providing additional channels for any one theatre. As intercommunication is installed, and adjustments to equipment are made in the laboratories above, the presence of a monitoring technician in theatre is rarely necessary. The system works well and its convenience ensures frequent use. Its value in the care of difficult and complicated cases needs no emphasis but, as in the States I am particularly impressed with its teaching potential. Staff become familiarised with "lines" and it is an excellent way of observing the effects of drugs, etc., on the cardiovascular system during anaesthesia.

We were lucky in that Ninewells Hospital was commissioned before reorganisation. Our closest contact with it is the Divisional System. We have

found this to be inefficient, even potentially trouble-making, and we now use it little, preferring to do our business at private Departmental meetings and via time-honoured personal contacts. Interdisciplinary disputes can be amicably settled, instead of being aggravated by official correspondence and insensitive minutes. We shall all be the losers if the new officialdom replaces the old-fashioned courtesies. Anthony Lejeune expressed it as follows in the Daily Telegraph (6):

"People are no longer meeting each other in the right context. 'Sometimes in a smoking room, one learns why things were done', wrote Kipling. Communicating the secret wisdom of the tribe — why things were done and how they should be done — is a vital process; and therefore the smoking room, or its equivalent, is an essential place. If there are no such unofficial meeting places, the official meeting places — and the official lies — become too powerful."

We have many unnecessary irritations to put up with these days, but we still practise a thoroughly satisfying, vital and enjoyable specialty, and relations with patients and colleagues remain excellent. These are important advantages which are at least as much in evidence in this country as in any other.

### Acknowledgments

My thanks are due to Drs. Bisset, Forrest Gray and Milne for help given to me in preparation of this Address.

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6. Daily Telegraph, Dec. 29, 1976.

| Year | Deliveries | Epidurals |      | EPI C/S | Dural Tap |     |
|------|------------|-----------|------|---------|-----------|-----|
|      |            | No.       | %    |         | No.       | %   |
| 1970 | 3841       | 85        | 2.2  | 16      | 1         | 1.2 |
| 1971 | 3765       | 119       | 3.2  | 20      | 1         | 0.8 |
| 1972 | 3461       | 265       | 7.7  | 64      | 4         | 1.5 |
| 1973 | 3256       | 387       | 11.9 | 104     | 5         | 1.3 |
| 1974 | 3174       | 608       | 19.2 | 134     | 7         | 1.2 |
| 1975 | 3188       | 680       | 21.3 | 138     | 4         | 0.6 |
| 1976 | 3079       | 783       | 25.4 | 140     | 5         | 0.6 |

Table 1. Development of obstetric epidural service in Dundee, 1970 - 1976

|   |     |     |     |     |   |     |
|---|-----|-----|-----|-----|---|-----|
| Total patients                              | ... | ... | ... | ... | — | 616 |
| General anaesthesia in addition to epidural | ... | ... | ... | ... | — | 124 |
| Epidural continued for LUSCS                | ... | ... | ... | ... | — | 492 |
| Satisfactory analgesia                      | ... | ... | ... | ... | — | 452 |
| Failed analgesia                            | ... | ... | ... | ... | — | 40  |

Table 2. Patients in labour with epidural in situ coming for LUSCS, 1970 - 1976

## A NEW ERA IN TOOTH PULLING

On December 11th 1844 an event took place which not only heralded the development of anaesthetic practice, but also established a method of anaesthesia which is still employed in some dental surgeries to-day. The event was the administration of unsupplemented nitrous oxide, with presumably associated hypoxia, to Horace Wells to facilitate the removal of a tooth. On awakening from this episode Horace Wells was heard to exclaim "A New Era in Tooth-pulling".

Some 130 years later we stand at the cross roads in respect to dental anaesthetic practice. Although we have no precise information as to the number of general anaesthetics administered to dental outpatients in the British Isles the figure may be as high as 2 million, but possibly falling. With an associated mortality of about 10 to 15 deaths per annum, the mortality *rate* would seem to be rising. We appear to be unique as a nation, in perpetuating a state of affairs which no other country seems to consider acceptable practice. In the U.K. the general anaesthetics for dental outpatients are administered by a variety of practitioners with varying degrees of knowledge, attitudes and skills. Training for such practice is in some instances totally inadequate. The premises, equipment, recovery and resuscitation facilities are likewise of a varying standard.

The dental patient presenting for outpatient general anaesthesia requires assessment as to his suitability for this method of anaesthesia. Apart from concomitant medical disorders the patient may be receiving a variety of drugs. Adequate screening of patients is therefore of the utmost importance. In many dental schools teaching of undergraduates in basic medicine is superficial and unlikely to inculcate the rigid discipline of careful patient selection. For the fit patient presenting for exodontia the choice lies between general anaesthesia and local anaesthesia with or without intravenous or inhalational sedation. In many instances little thought would appear to have been given to the alternatives to general anaesthesia. It also would appear that some general anaesthetics

are being administered for the sole purpose of giving a student the opportunity to gain experience.

Patients presenting for general anaesthesia for exodontia demonstrate a high resting pulse rate, evidence of high sympathetic autonomic activity. During general anaesthesia this autonomic hyperactivity prevails with approximately 30% of patients demonstrating cardiac arrhythmias. There is also considerable lability of the blood pressure. Despite relatively high concentrations of oxygen in the inspired mixture hypoxaemia tends to occur particularly during insertion of the mouth prop and pack and at the time of removal of teeth. This respiratory obstruction is often unnoticed by the anaesthetist. The adoption of the horizontal posture for the patient whilst reducing the vulnerability of the brain to changes in blood pressure and hypoxaemia, does not necessarily improve airway maintenance nor reduce the chances of inhalation of foreign material. Careful packing is the key to the smooth conduct of the anaesthetic. Such packing must not only avoid reduction in the patency of the respiratory tract but must prevent mouth breathing and contamination of the respiratory tract with blood, pus, or tooth fragments. The return of street fitness may be delayed particularly if intravenous agents have been employed. All patients should be accompanied by a responsible adult both of whom should sign a form prior to induction of anaesthesia acknowledging that they must ensure that the patient must not indulge in any activity likely to harm himself or others for up to 24 hours after the anaesthetic.

Anaesthetic machines must deliver accurate concentrations of oxygen over a wide range of tidal volumes and rates. In this respect some intermittent flow demand machines have been found wanting.

Whenever possible, patients should be offered local anaesthesia with or without sedation. Such sedation may be administered by the intravenous or inhalational route. The aims of such controlled

sedation should be to produce a relaxed but fully cooperative patient. There should be no loss of consciousness as the patency of the airway cannot be guaranteed unless verbal contact is maintained. Associated anterograde amnesia as is found following the intravenous injection of certain benzodiazepines (diazepam, flunitrazepam, lorazepam) is an additional benefit. There should be minimal effects on the cardiovascular and respiratory systems, and no excitatory phenomena or involuntary movements. If an intravenous agent is employed, subsequent thrombophlebitis is sometimes an added complication (e.g. diazepam). A rapid return of 'street fitness' is essential. Ideally the safe level of anxiolysis should be carefully "titrated" by the dental surgeon acting as an anaesthetist before he commences his operative work. If the drug or technique employed is likely to cause loss of consciousness then a trained anaesthetist must be present.

Many drugs and combinations of drugs have been used to produce sedation for exodontia. None satisfy the criteria enunciated. Techniques employing the injection of minimal quantities of methohexitone althesin and propanidid have been administered. Pentobarbitone, pethidine, hyoscine (Jørgensen technique), diazepam alone or with methohexitone or pentazocine and many other permutations and combinations have been tried. Flunitrazepam a water soluble benzodiazepine has the advantage over diazepam in that there is a much lower incidence of thrombophlebitis following its intravenous administration. Whilst

the benzodiazepines confer the added benefit of amnesia all are broken down slowly by the body and their metabolites which often have hypnotic properties may linger in the body up to 5 days after their administration. The inhalational technique of relative analgesia (Langa) employing low concentrations of nitrous oxide holds out greater promise. The introduction of the ultra-light intermittent methohexitone technique by Drummond-Jackson represented a brave attempt to allay the anxiety of the dental patient and the search for new drugs and techniques continues.

Training in dental anaesthetic practice should be a postgraduate study. Training programmes will need to be recognised. The general professional training of medically qualified anaesthetists which is at present seriously deficient in dental anaesthetic experience, requires improvement. Apprenticeship of the trainee to a skilled dental anaesthetist is necessary. Weekend and week courses have little value in developing the necessary skills and attitudes and should serve more as a refresher to already trained anaesthetists.

The dental anaesthetist, once trained, should be accepted on a "list" of recognised anaesthetists. Inclusion on such a list should command additional remuneration. Premises where dental anaesthetics are administered should be inspected in order to ascertain whether equipment, resuscitation and recovery facilities satisfy approved standards. There should be a confidential enquiry into mortality associated with dentistry.

## THE SWAN-GANZ CATHETER IN A RESPIRATORY INTENSIVE CARE UNIT

**Introduction**

Invasive techniques of monitoring are generally associated with a variable degree of risk to the patient. They are also expensive in terms of both finance and manpower; therefore it is necessary to evaluate their usefulness in the clinical situation. For this purpose Swan-Ganz catheters were introduced to our intensive care unit and their value assessed after a four month period.

The Swan-Ganz catheter, which was introduced in 1970<sup>1</sup>, is a modified right heart catheter on which an inflatable latex balloon surrounds the distal tip. The balloon acts as a float and directs the catheter in the flow of blood through the heart into the pulmonary artery. Radiological control of placement is not required as the pressure wave form recorded from the tip identifies the chambers of the heart and the pulmonary artery. When the tip lies in a distal pulmonary artery, the balloon wedges in the vessel and the pressure recorded is a reflection of the back pressure from the left atrium. This is called the **pulmonary wedge pressure** and is accepted as being equivalent to left atrial pressure<sup>2,3</sup>.

The catheters used in this study were quadruple lumened I.L. 7F catheters calibrated for use with an I.L. 601 cardiac output computer. They were connected by Ackers AE 840 physiological transducers to a suitable display and recorder system and were flushed continuously with the "Intraflo" system (Sorenson Research) using heparinised saline.

The information available from this equipment is shown in Table 1.

**Insertion of the Catheter**

Several techniques of insertion have been described<sup>1,4,5,6</sup> using a variety of veins — internal and external jugular, subclavian, cephalic and antecubital. Of the eleven patients in this study, eight had catheters inserted via the antecubital fossa and three via the internal jugular vein. The latter route is to be preferred as it provides a straight route into the heart and is easily fixed in

position. Surgical cut-down should be avoided if possible to minimise the risk of infection although one patient in this series required a cut-down because of extreme obesity. A modified Seldinger technique was developed by the author using a guide wire inserted into the vein through a standard intravenous cannula. A cardiac catheter introducer (Edwards Laboratories) is then inserted over the guide wire and the Swan Ganz catheter can then be inserted through the introducer.

Patients admitted to the Intensive Care Unit usually have major derangements of vital functions resulting in instability of circulation or impaired myocardial performance. It is now generally accepted that the traditional methods of monitoring the cardiovascular system are not adequate in very seriously ill patients<sup>5,7,8</sup> and that measurement of left atrial pressure and central venous pressure simultaneously gives a much more sensitive index of change in circulatory performance. The Swan Ganz catheter provides the ability to measure left and right atrial pressures and so it was hoped would prove of considerable value in the intensive care situation.

**Material and Results**

The selection of patients is shown in Table 2. Several interesting clinical situations arose and these are briefly described below.

1) A 60 year old lady with chronic obstructive airways disease was admitted with septic shock after bowel perforation (Table 3). Strict reliance on C.V.P. would have led to inadequate fluid replacement as the wedge pressure showed her to be severely hypovolaemic in spite of a normal C.V.P.

2) This patient, a 43 year old man with cirrhosis for portocaval shunt with ischaemic heart disease, had his catheter inserted prior to surgery. His pressures (Table 4) showed that the C.V.P. gave no indication of overtransfusion until the wedge pressure showed a dangerously high left atrial pressure and impending left ventricular failure.

3) A 64 year old man was admitted to the Intensive Care Unit with respiratory failure thought to be cardiac in origin. Swan-Ganz catheterisation showed him to have normal pressures (Table 5) so that left ventricular failure could be eliminated. He was subsequently shown to have an infiltrating adenocarcinoma of lung.

4) A 45 year old woman was admitted with respiratory failure thought to be due to pulmonary oedema. However Swan-Ganz catheterisation showed her pressures to be suggestive of pulmonary embolism, subsequently thought to be fat embolism (Table 6).

5) In one case, a 23 year old man with fat embolism, the Swan-Ganz catheter was used not for measuring pressures but for finding an optimum ventilatory pattern using P.E.E.P. with no detrimental effect on cardiac output. As can be seen from Table 7 his cardiac output increased at 7cms P.E.E.P. presumably due to better myocardial oxygenation.

### Complications

The hazards and complications of Swan-Ganz catheters are well documented<sup>5,9-15</sup> and, provided strict care is taken to avoid introducing infection and certain precautions are adhered to, the complication rate is acceptably low. The complications and problems we encountered are shown in Table 8. Ventricular arrhythmias occurred in six of our patients and lead to abandonment of the procedure in one case. Another case was abandoned because of inability to enter the thorax from the arm. Apart from two minor technical problems we had no other complications attributable to the catheter.

### Discussion

As a result of these experiences with Swan-Ganz catheters in an Intensive Care Unit three possible problem areas are highlighted.

1) **Medical Staffing** : In order to avoid incursion into the day-to-day running of the Unit, and to avoid missing suitable cases, the responsibility for selecting cases, inserting catheters and looking after them was allocated to two members of medical staff who were free from other clinical duties on alternative periods.

2) **Technical Assistance** : Because of the cost and complexity of the equipment, it was felt that technical assistance from the Instrument Laboratory was desirable. However, Swan-Ganz catheters can be inserted and maintained using less sophisticated equipment of the type found in most Intensive Care Units.

3) **Nursing acceptance** in this has to be gained by education and also by demonstration of the obvious benefits to be derived.

Provided these three areas can be satisfactorily accounted for, the technique of Swan-Ganz catheterisation should be regarded as a relatively simple intensive care technique which should be available outside specialised Cardiological Units.

### Acknowledgements

The author wishes to acknowledge the considerable part played by Dr. Stanley Zimmer, Senior Registrar, Department of Anaesthesia, in the project and the guidance and advice of Professor Donald Campbell of the University Department of Anaesthesia, Glasgow Royal Infirmary in the preparation of the paper.

TABLE 1

#### Information available from Swan-Ganz Catheter

|              |   |                             |
|--------------|---|-----------------------------|
| Continuous   | — | Central venous pressure     |
|              | — | Pulmonary arterial pressure |
| Intermittent | — | Pulmonary wedge pressure    |
|              | — | Cardiac output              |
| Sampling     | — | The mixed venous blood      |



**TABLE 2**  
**Selection of Patients**

|   |   |          |   |
|---|---|----------|---|
| Established Respiratory/Cardiovascular Problems |   |          |   |
| Medical   | 5 | Surgical | 2 |
| Anticipated Respiratory/Cardiovascular Problems |   |          |   |
| Medical   | 0 | Surgical | 4 |

**TABLE 3**

|                         |                     |                              |
|-------------------------|---------------------|------------------------------|
| <b>Female 60 years</b>  | <b>Septic Shock</b> |                              |
| <b>Pressure (mm Hg)</b> | <b>Admission</b>    | <b>After 1.5 L of plasma</b> |
| Systemic                | 70/?                | 110/75                       |
| C.V.P.                  | 9→12                | 14                           |
| Wedge                   | 2                   | 10                           |

**TABLE 4**

|                         |                          |                       |                   |
|-------------------------|--------------------------|-----------------------|-------------------|
| <b>Male 43 years</b>    | <b>Porto-caval Shunt</b> |                       | <b>After</b>      |
| <b>Pressure (mm Hg)</b> | <b>Intra-operative</b>   | <b>Post-operative</b> | <b>Fruusemide</b> |
| Systemic                | 70/40→130/80             | 110/70                | 130/80            |
| C.V.P.                  | 4→8                      | 8                     | 7                 |
| Wedge                   | 5→10                     | 20                    | 10                |

**TABLE 5**

|                         |                            |
|-------------------------|----------------------------|
| <b>Male 64 years</b>    | <b>Respiratory Failure</b> |
| <b>Pressure (mm Hg)</b> | <b>Admission</b>           |
| Systemic                | 130/80                     |
| C.V.P.                  | 8                          |
| Wedge                   | 10                         |

**TABLE 6**

|                         |   |                 |
|-------------------------|---|-----------------|
| <b>Female 45 years</b>  | <b>Respiratory Failure – ? pulmonary oedema</b> |                 |
| <b>Pressure (mm Hg)</b> | <b>Admission</b>                                | <b>24 hours</b> |
| Systemic                | 115/60  | 105/65          |
| C.V.P.                  | 9   | 9               |
| Wedge                   | 13  | 11              |
| Pulmonary Artery        | 48/23   | 50/22           |

TABLE 7

| Male 23 years                      | Fat Embolism |             |               |
|------------------------------------|--------------|-------------|---------------|
|                                    | Admission    | Digitalised | Optimum State |
| F10 <sub>2</sub> %                 | 100          | 100         | 100           |
| P.E.E.P.<br>(cms H <sub>2</sub> O) | 0            | 0           | 7             |
| PaO <sub>2</sub> (mm Hg)           | 45           | 53          | 120           |
| Cardiac Output (l/min)             | 5.1          | 6.0         | 6.55          |

TABLE 8

## Incidence of Complications

|           |                   |
|-----------|-------------------|
| VES       | 6                 |
| VT        | 1 (abandoned)     |
| Technical | 2 (one abandoned) |
| Haematoma | 1                 |

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Total No. of Patients 11 (two abandoned)

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## COMMITTEE REPORTS

### SCOTTISH STANDING COMMITTEE OF THE FACULTY OF ANAESTHETISTS

In the past year, the composition of the Scottish Standing Committee of the Faculty of Anaesthetists has undergone some changes. Professor Robertson has now retired, his term of office as a member of the Board of Faculty having come to an end. The Standing Committee is greatly indebted to him for all he contributed to the early years of the Committee, and his wise and often forthright opinions will be greatly missed. Dr. Raffan too has retired, and the Committee would like to put on record its sincere appreciation of the help he gave and wish him a long and happy retirement. Dr. J. Kyles and Dr. A.A. Spence were nominated for the two vacant places on the Committee and were declared elected, there being no other nominations.

Perhaps the thorniest problem during the year has continued to be the Hospital Practitioner Grade. The Faculty has now issued its own guidelines for such appointments and follow closely the outline laid down by the Standing Committee. The last has not been heard of this grade however. During the year, various meetings at the higher level have been held and Fellows will have noted the various shades of opinion, both for and against, which have been expressed. One important thing is that the hasty automatic upgrading of all G.P.s has been stopped as a result of the Standing Committee's representations and time allowed for more mature reflection.

A new problem has been the tenure of appointment of Senior Registrars. On the one

hand, certificates of accreditation for Higher Professional Training have been instituted and have been issued to a number of Senior Registrars. These are a recognition of the fact that the holders have completed their training and have reached the standards appropriate to the Consultant grade. On the other hand, Senior Registrars are becoming increasingly reluctant to apply for Consultant posts, and are being allowed to extend their term of appointment, perhaps in part because of worries in the past of the employing authority about the terms of the Employment Protection Act. The net result is stagnation in the Registrar grade, and the College of Surgeons thought the matter of sufficient importance to include it in their submission to the Royal Commission. The Standing Committee has no wish to see Senior Registrar appointments terminate abruptly or without a reasonable period of warning, but movement within the grade is important to the training structure, and discussions are continuing with the S.H.H.D. to try to find a satisfactory solution.

A variety of other matters has been discussed, including the Report of a Committee of Enquiry into Competence to Practise, the Senior Registrar establishment, the functions of National Panel members, the implications of the new specialty of Accident and Emergency Medicine and current topics being discussed by the S.J.C.C., the N.M.C.C., and other committees.

A.H.B. Masson,  
Hon. Secretary

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### SCOTTISH COMMITTEE FOR HOSPITAL MEDICAL SERVICES

Anaesthetists continue to be well represented on this Committee, and it is with pleasure I can report that, Dr. Ian Davidson, one time Scottish Society representative on S.C.H.M.S. is now the Deputy Chairman.

As many people seem to be unclear as to the function of this committee, without apology to those who know, I will give a brief note on our

remit.

The committee consists of members selected from Area Hospital Services Committees, the Royal Colleges and Specialist Associations such as ourselves. The Committee considers matters concerned with pay and conditions of service of all doctors working in hospital and can refer matters to the Scottish Joint Consultants' Committee, and

via that body to the Home and Health Department and also to the Central Committee for Hospital Medical Services, through which body we are directly involved in the negotiating machinery.

Matters under consideration at present are the S.H.M.O. review, Hospital Practitioner grade, Appointment Committees and increments on appointment, the effects of North Sea Oil, and the recent proposals for private insurance companies to take an interest in medico-legal insurance. The two most notable topics have been:—

#### Review Body Report

It was decided to accept this, noting the strong wording with regard to the deplorable financial position facing N.H.S. Consultants to-day.

However in light of the report, "appropriate action" should be taken should the Government fail to correct in the near future the injustice and

anomalies affecting Consultants, but the twelve month rule should be adhered to.

#### Consultant Contract

Discussions continue with the Government on the terms of the new contract and progress is being made along the basis of the 10 National half-day contract. Other matters under discussion are such things as finance for consultants' cars, telephones and other matters like recall payments and distinction awards. These discussions are taking place with no reference to pricing because of the present pay policy, but can probably be completed by the next Review Body report.

Members are elected to the S.C.H.M.S. to discuss these matters on your behalf and will be willing to help with problems you may wish resolved or discussed.

D.S. Arthur.

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### REPORTING OF DEATHS ASSOCIATED WITH ANAESTHESIA

At the Annual General Meeting of the Scottish Society of Anaesthetists the decision was taken to set up a small working party to consider the question of reporting deaths associated with anaesthesia. The members of the working party are Drs. Masson, Murray Lawson, Spence and Arthur.

Enquiry into deaths under anaesthesia was instituted in Scotland in 1904 by the then Lord Advocate, probably as a result of the increasing number of fatalities with chloroform. Some of the regulations that were subsequently imposed bore heavily and unfairly on anaesthetists. In the 1950's, Dr. Lawrie when he was President of the Scottish Society of Anaesthetists opened negotiations with the Crown Office and as a result of his efforts and those of the Council of the Scottish Society, various important changes were made in the reporting procedure. The heading on the report form was changed from 'Deaths under Anaesthesia' to 'Deaths associated with anaesthesia and/or operation'. Space was allocated for relevant clinical details of the operation as well as the anaesthetic, the surgeon was involved as well as the anaesthetist and the circumstances under which deaths should or should not be reported were clarified. Many may think that the present system works tolerably well. Certainly the Crown

Office is likely to resist change and to reject any suggestion of abolishing such reports. It is of course easy and indeed it is justifiable to complain about the iniquity of being singled out from all the branches of medicine but it is important to be clear about the implications of any changes we may wish. If there are felt to be abuses under the present system, could it not be modified so as to prevent the abuses rather than scrap the system altogether? Does the present system in fact protect the anaesthetist as the Crown Office suggests? Do we want an internal policing system (like the Confidential enquiry into Maternal Death) perhaps as a first step to abolition of a judicial enquiry in all cases and, if so, how could it be done? Should the criteria for reporting be revised? Certainly new circumstances such as cerebral death introduce another factor which should be considered. If we wish an internal enquiry, how would we define the borderline between deaths which should be investigated by medical man and those sudden or unexpected deaths which should properly be investigated by the Procurator Fiscal?

These are difficult and complicated problems and the working party would welcome any suggestions from any anaesthetists in Scotland on any matter relevant to their remit.

## ASPECTS OF PHARMACOLOGY IN ANAESTHESIA

### 4-AMINOPYRIDINE AND NEUROMUSCULAR FUNCTION

Professor W.C. BOWMAN

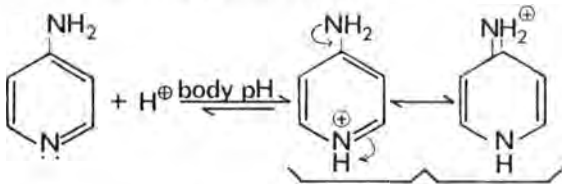
4-Aminopyridine hydrochloride has recently been used extensively by Bulgarian anaesthetists, under the name "Pymadin", as an anticholinergic agent (see, for example, Paskov *et al* 1973, *Eksp. Khir. Anesthesiol.*, **18**, 48-52). According to the Bulgarian anaesthetists, the compound has the advantages, over neostigmine and pyridostigmine, that previous atropine is not required; that there is little or no effect on the cardiovascular system of man with doses (about 20 mg i.v.) that completely restore neuromuscular transmission (N.B. in cats, the anticholinergic action is accompanied by a slight hypertension); that respiration is more effectively restored and for a longer period; that the compound can be used safely in debilitated patients and in patients with cardiac and other diseases; that it is synergistic with anticholinesterase drugs, and remains effective in conditions in which anticholinesterase drugs are ineffective or have already produced their maximal effects. The compound has a weak central stimulant action which may contribute to its beneficial effect in restoring breathing. Agoston and others (personal communication) have found 4-aminopyridine to be effective in restoring neuromuscular transmission in the Eaton-Lambert syndrome, and it is possible that it may be of value in myasthenia gravis.

Except where otherwise stated, most of the results of animal experiments referred to in this brief review have been obtained by Drs. A.L. Harvey, I.G. Marshall, H.H. Khan and A.O. Savage of the Department of Physiology & Pharmacology of the University of Strathclyde, and they are as yet unpublished. In animal experiments the compound restores transmission during neuromuscular block produced by tubocurarine, gallamine, pancuronium or other nondepolarizing blocking agents, but, as Foldes and others have shown, it is ineffective during transmission failure

produced by depolarizing drugs. It is effective against transmission failure produced by aminoglycoside antibiotics, by excess magnesium ions, and, according to Thesleff, by botulinum toxin.

Analysis of the action of 4-aminopyridine on nerve-muscle preparations shows that it augments endplate potentials evoked by nerve stimulation in the presence of tubocurarine or excess  $Mg^{2+}$ , but does not affect endplate potentials produced by micro-iontophoretic application of acetylcholine. It is without direct depolarizing activity on nerve-free cultured muscle fibres obtained from chick embryos, and it is devoid of anticholinesterase activity. These results combined indicate that 4-aminopyridine facilitates neuromuscular transmission by a prejunctional action through which the release of acetylcholine by nerve impulses is enhanced. 4-Aminopyridine has been shown by Pichon and others to inhibit potassium conductance in squid and cockroach axons, and thereby to prolong the duration of the action potential. A similar prolongation of the action potential in the nerve endings at the neuromuscular junction could account for the increase in evoked acetylcholine release. In larger concentrations, 4-aminopyridine increases the frequency of the miniature endplate potentials, and also gives rise to so-called 'giant' miniature endplate potentials which are 2 or 3 times the normal size. This effect on spontaneous acetylcholine release cannot be related to any effect on nerve action potentials. A high calcium ion concentration increases both the evoked and the spontaneous release of acetylcholine, and when nerve-muscle preparations are exposed to an acid bathing medium containing a high  $[Ca^{2+}]$ , and then returned to a more physiological solution, Pecot-Dechavassine has shown that there is an increase in the frequency of giant miniature

endplate potentials. The pyridine N of 4-aminopyridine has a pKa value of 9.25, and the molecule is therefore almost entirely in the protonated form at body pH values. The charge on the cationic form is delocalized, the extremes being represented by the two forms on the right hand side of the equation below.



Experiments have shown that 4-aminopyridine cannot substitute for calcium ions, but it is possible that in the protonated form it acts to facilitate the access of calcium ions to the acetylcholine-release mechanism. It may also be that any effect it has on potassium conductance in the terminal axonal membrane, is secondary to the release of  $\text{Ca}^{2+}$  into the axoplasm from membrane or internal storage sites.

Dantrolene sodium is used therapeutically to relieve various forms of muscle spasticity. Its point of action is beyond membrane excitation in the series of events leading to contraction, and it therefore produces contraction failure in the presence of normal muscle action potentials. In the normal excitation-contraction coupling sequence, the muscle fibre action potential propagates from the endplate region around the plasma membrane and along the transverse tubules to the junctions with the lateral sacs of the sarcoplasmic reticulum, the so-called triads. Here it causes the release of a small amount of  $\text{Ca}^{2+}$  termed 'trigger calcium'. By a kind of cascading mechanism, the trigger calcium then causes the release of more  $\text{Ca}^{2+}$ , so-called 'activator calcium', from the lateral sacs and vesicles. Troponin binds the activator calcium, directing it in such a way that myosin ATPase is activated, and cross-bridges between actin and myosin are formed with the result that contraction occurs. Dantrolene is believed to impair the release of trigger calcium at

the triadic junctions, interfering with the contraction sequence in this way. According to Denborough, the muscular defect in malignant hyperpyrexia results in excessive release of trigger calcium, and he postulates that dantrolene would therefore be the drug of choice for relieving the spasticity, providing that it can be solubilised for intravenous injection. The drug has been found by Harrison and others to be effective in relieving the symptoms of malignant hyperpyrexia in Landrace pigs, which congenitally suffer from this condition.

Attempts have been made in experiments on isolated mammalian nerve-muscle preparations to antagonise the paralytic effects of dantrolene by a number of substances known to increase sarcoplasmic calcium concentrations by one means or another. Such substances have included the calcium ionophore A23187, thiocyanate ions, adrenaline, quazodine, caffeine, quinine and quinidine. All proved to be effective to a greater or lesser extent, but in all cases the effective concentrations were greatly in excess of any that could be tolerated by intact animals or man. Additionally, the effects of 4-aminopyridine were tested, because there is some evidence in the literature that, in addition to its action on transmission, it may increase muscle contractility by a direct action on the muscle fibres. In the directly stimulated isolated hemidiaphragm preparation of the rat, in which neuromuscular transmission was completely blocked by the irreversible cholinergic antagonist erabutoxin  $\alpha$ , 4-aminopyridine antagonised the depressant effect of dantrolene. The effective concentrations of 4-aminopyridine were 5 to 8 times greater than those necessary to antagonise tubocurarine at the neuromuscular junction in the same preparation, and it is not yet known whether such concentrations are within tolerable limits. However, it is of interest that once again 4-aminopyridine is acting on a calcium-dependent system, and this provides further suggestive evidence that it may work by displacing calcium ions from their binding sites.

## CARDIOVASCULAR EFFECTS OF ETOMIDATE IN RABBITS

Dr. R.L. HUGHES

Etomidate is a recently introduced imidazole derivative which is currently undergoing trials as an anaesthetic induction agent in the UK.

There have been a number of studies with this drug in both animals and man<sup>1,2</sup> which emphasise the negligible cardiovascular effects seen. However, a report last year, on more elderly patients, showed significant drops in mean arterial pressure and stroke volume<sup>3</sup>.

At Glasgow Royal Infirmary we have used two rabbit models to attempt to identify the sites of action of the drug. One of the models was also used to study the effects of the drug on the baroreceptor reflex. These models are the decerebrate and the pithed rabbit preparations<sup>4,5</sup>.

The decerebrate preparation has been used to study the effects of anaesthetic agents unmodified by the background anaesthesia which is necessary in intact preparations. This model enables us to study (a) cardiovascular mechanisms in the relatively intact animal and (b) the baroreceptor reflex in unanaesthetised animals.

The rabbit is particularly suitable for study of the baroreceptor reflex as it has a separate aortic depressor nerve carrying only pressoreceptors. We dissect out this nerve, desheath it and place it upon a stimulating electrode. By stimulating it we simulate hypertension, and depression of the vasomotor and cardiac centres of the hindbrain occurs. This results in reduced sympathetic nerve activity, mean arterial pressure and heart rate, all of which we measure during 20 second stimulation periods.

The decerebrate group of rabbits was given doses of 0.5, 1, 2, 4 and 8 mg/kg of Etomidate at half-hourly intervals, when the rabbit had fully recovered from the previous dose (the mean sleep dose is 0.5 mg/kg in rabbits). The immediate effect on mean arterial pressure, heart rate and sympathetic nerve activity was measured. The effect on the baroreceptor reflex 2 minutes later was measured.

The pithed rabbit preparation first had its left carotid artery cannulated with a concentric double cannula. The outer cannula was left in the carotid artery, while the inner cannula was passed into the

left ventricle. A thermistor probe was passed via the right carotid artery into the aorta. A cannula was fed via the right external jugular vein into the right atrium for injection of drugs and cold saline (for thermal dilution cardiac output measurements).

The rabbit was then decerebrated by suction and pithed via the trephine hole. The pithing rod is stainless steel covered with teflon apart from 12 mm at its tip. An indifferent electrode of silver wire was placed subcutaneously over the cervical vertebrae. The rod was withdrawn to the level of T8 where a rise in arterial pressure was produced solely due to stimulation of vasopressor fibres but not cardiac sympathetic fibres.

The pithed rabbits were given Etomidate in doses of 0.5, 1, 2 and 4 mg/kg. We first made baseline measurements of (1) cardiac output, (2) stroke volume, (3) peripheral resistance, (4) left ventricular systolic pressure, (5) left ventricular end diastolic pressure, (6) left ventricular dP/dt max, (7) mean arterial pressure, (8) heart rate. We measured the response of all these variables to Etomidate in the basic preparation.

We then determined whether Etomidate affected the pressor response due to a short period of electrical stimulation down the pithing rod. This would demonstrate whether, at 2 minutes after Etomidate, nerve conduction or vessel response to sympathetic stimulation was affected.

To further elucidate the site of action, the effect of Etomidate on the pressor response due to 0.3 µg/kg of noradrenaline was measured. This would demonstrate an effect of the drug on the neuro-effector junction or on myogenic activity of the vessel.

Finally, we continuously electrically stimulated the rabbit via the pithing rod to maintain an elevated blood pressure. This produced a blood pressure similar to that in the decerebrate preparation and allowed us to compare the effects of Etomidate on these two preparations.

Etomidate produced a dose-related fall in mean arterial pressure and sympathetic nerve activity in the decerebrate rabbit. It produced a lesser effect on the mean arterial pressure in the pithed rabbit.

This suggests that the recorded fall in sympathetic nerve activity mediates a central cardiovascular depressant effect of Etomidate.

There was a significant reduction in left ventricular dP/dt max which was dose-related, suggesting that Etomidate depressed myocardial contractility. Etomidate reduced the peripheral resistance at all dose levels in the continuously stimulated rabbit but only at 4 mg/kg in the basal preparation. This is to be expected as vascular tone is greater in the continuously stimulated rabbit, and it is therefore more sensitive to drug effects.

Brief electrical stimulation 2 minutes after Etomidate produced the same effect on mean arterial pressure as the control but there was a reduction in the response of left ventricular dP/dt max to this stimulation. This could be due to a small fall in peripheral resistance, due to interference with sympathetic ganglia or nerve conduction, leading to a measurable reduction of left ventricular dP/dt max via the Starling effect.

Etomidate produced no effect on the pressor response to noradrenaline, suggesting it had no effect, in the unstimulated pithed rabbit, on sympathetic receptors in the blood vessels or on vascular smooth muscle.

Etomidate had no effect on the baroreceptor reflex. This was possibly reflected in the fact that heart rate fell a small but significant amount in the pithed rabbit but not in the decerebrate rabbit. This may be due to the decerebrate animal, with

intact baroreceptor mechanisms, responding to a fall in mean arterial pressure by maintaining its heart rate while the unbuffered pithed animal demonstrates the negative chronotropic action of Etomidate.

To summarise, Etomidate has minimal cardiovascular effects when given as a bolus at clinical doses. However, at increasing doses it produces depression of central sympathetic activity, myocardial contractility and peripheral vascular resistance.

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## A CONTINUING CLINICAL COMPARISON OF ETOMIDATE AND METHOHEXITONE

Dr. BARBARA MILLER

Etomidate, a new intravenous induction agent, has been extensively used on the Continent with success but is at present undergoing stringent clinical investigation in five centres in the United Kingdom.

The Victoria Infirmary in Glasgow has been evaluating the usefulness of Etomidate in

out-patient anaesthesia and in 18 months it has now been given to over 300 patients

The work can be summarised thus:—

#### Project

- (1) Evaluation of safety and ease of use. (Solvent — Water or Saline).



- (2) Introduction of new solvent (Polyethylene Glycol) PEG 1000.

#### **Aim**

- (1) Cardio-stable — Respiratory-stable. Easy to use. No histamine release.
- (2) do.

#### **Side Effects**

- (1) Pain on injection +++ Myoclonus. +++
- (2) Pain reduced 25% — 4% Myoclonus. +++

Due to marketing problems in the U.S.A. the manufacturers have now introduced a third and, hopefully, final preparation — Etomidate in propylene glycol. Using this preparation a double blind trial was instituted to compare its effects with those of Methohexitone — a known standard intravenous agent commonly used in outpatient anaesthesia.

Psychological testing was carried out to look at the recovery period in more detail — our aim being firstly to detect if there was any difference after recovery from the two drugs and secondly to assess the value of these tests in assessment of patients' fitness to leave hospital.

One hundred patients for outpatient cystoscopic examination were matched in pairs for sex and age and randomly allocated to one of two groups. Fifty patients received Etomidate 0.3 mg/kg and the remainder Methohexitone 1.5 mg/kg. The study was double blind. The volumes and appearances of both drugs were similar. All patients were premedicated with atrophine 0.6 in 20 minutes prior to induction of anaesthesia.

The effect of the drugs on heart rate, and blood pressure was measured pre-operation, pre-injection, post-injection and on recovery which was taken to be the time from the end of anaesthesia till the patient opened his eyes. Anaesthesia was maintained with 66% nitrous oxide and 1% halothane in oxygen. The mean duration of anaesthesia was  $5.5 \pm 0.3$  mins. The incidence of side effects was noted both during and after anaesthesia. A battery of psychological tests was given to patients 30 minutes pre-operation and 5 minutes after recovery.

## **RESULTS:**

### **Cardiovascular System.**

We found that measuring heart rate and blood pressure showed no significant differences between the two groups. Propylene glycol has not altered the marked cardio-vascular stability already seen with Etomidate.

Apnoea was not a feature of either drug in this series although 9 out of the 50 Methohexitone patients showed hiccough/coughing compared with 2 in the 50 Etomidate patients.

### **Side Effects.**

- (1) **Pain on injection:** The reduced incidence of pain on injection seen with PEG 1000 is maintained with propylene glycol, i.e. 4%. No significant differences were seen between the two groups of patients. The overall incidence of pain was 4% in the Etomidate group and 6% in the Brietal group.
- (2) **Myoclonus:** Propylene glycol fails to produce a reduction in the incidence of involuntary muscle movement. There was a highly significant difference between the two groups. The overall incidence was 22% in the Etomidate group and none with the Brietal group. This was in agreement with the high incidence of myoclonus seen with Etomidate in our previous studies.

### **Recovery Times.**

There were no significant differences between the early recovery times which were rapid in both groups. Etomidate — 4.6 minutes.. Brietal — 3.8 minutes.

### **Psychological Tests.**

We were particularly interested in the following areas of function — Information, orientation, memory, logical reasoning (arithmetic), reaction time and balance. We found that in two of the tests, i.e. Information and orientation, there were no significant differences in either group between pre- and post-injection scores. For Methohexitone there was significant deterioration in the remaining four tests. For Etomidate there was a similar pattern of significant impairment in three of the tests re logical memory, reaction time and balance but no deterioration in the mental arithmetic test.

Comparing the degrees of impairment the important finding was that the Etomidate group was significantly less impaired in arithmetic ability and reaction time post-injection.

#### **DISCUSSION:**

Previous workers and our own studies to date have shown a marked degree of cardiovascular stability when Etomidate is used. The most recent substitution of propylene glycol as the solvent did not alter this. There were no significant differences in the cardiovascular effects between Etomidate and Brietal in our study. As in previous papers Etomidate showed remarkable respiratory stability but as might be expected the minor respiratory upsets normally associated with Brietal were in evidence.

The reduced incidence of pain on injection, i.e. 4% found with PEG 1000 was maintained in this series with propylene glycol and it compared favourably with the 6% found in the Brietal patients. Significantly no patients receiving Brietal showed myoclonus whereas the Etomidate group showed a similar high incidence of 22% to previous studies. It must be said, however, that no patient was aware of it and to our knowledge it produced no lasting effect. We also felt its severity to be much reduced when the solvent was changed to PEG 1000 and propylene glycol.

The rapid early recovery seen with previous solvent is maintained with propylene glycol and it compared favourably with that of Brietal. One of the more unsatisfactory areas in anaesthesia is the reliable assessment of recovery beyond this early recovery time. Therefore a battery of psychological tests was chosen to receive as broad a range as possible of behaviour relevant to normal functioning such as orientation, logical reasoning and balance. The information and orientation tests were of no discriminatory value in this investigation. However, the remaining four tests may have some potential value as an aid to assessment of recovery although a considerable amount of further investigation will be required before they could be of any value in routine outpatient anaesthesia.

#### **IN CONCLUSION:**

In our opinion Etomidate still shows itself to be an intravenous hypnotic with a promising future although the problem of myoclonus has still to be solved. From our results it would seem that Etomidate is no more detrimental over a broad range of behaviour than Brietal. In fact in at least two areas of function Etomidate causes less impairment than Brietal. The problem of finding a simple method of assessing recovery from anaesthesia by psychological testing is as yet unresolved.

# Registrars' Meeting

ABERDEEN — 4th NOVEMBER, 1977.

A record number of over seventy junior anaesthetists attended this highly successful meeting organised by Dr. C.R. Dundas.

Most of the programme was devoted to aspects of environmental and off-shore medicine but in the morning session, chaired by Dr. I. Smith, several excellent papers on more general topics were presented by junior members of the Anaesthetic Department. At this session, Professor J. Nelson Norman, Head of the Institute of Environmental and Off-Shore Medicine, spoke on the problems involved in providing medical treatment for men who become ill or sustain injury while working in the relatively inaccessible

environment of the North Sea.

After an excellent buffet lunch, generously provided by the Grampian Health Board, a visit was made to Comex Diving Limited, where diving systems were demonstrated and Dr. M. Cross, Medical Director, described some of the advanced telemetry systems which have been developed to collect physiological data.

In the final session, three papers on aspects of exposure were read by members of the Institute of Environmental and Off-Shore Medicine.

Short summaries of all the papers presented at the meeting appear below.

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## CPAP IN PAEDIATRIC INTENSIVE CARE

Dr. A.J. SHEARER

The use of CPAP (continuous positive airway pressure) in the management of respiratory distress syndrome is now well established. The value of CPAP in respiratory failure from other causes is now appreciated, particularly in conditions where there is good respiratory effort but a low  $\text{PaO}_2$ . It may be used to wean from IPPV or it may obviate the need for IPPV.

The CPAP circuit described by Gregory is still widely used. Modification by placing the inspiratory tube inside a smooth walled expiratory limb, makes the patient attachment lighter, there is better heat insulation of the inspiratory gases and water can be drained more easily.

For weaning from IPPV in smaller units almost any ventilator with a hot water humidifier can be modified to produce CPAP. The East-Radcliffe circuit with "dummy lung" as used for ventilation of neonates (Tunstall et al, 1968) has been further modified for CPAP by connecting the expired air port to an underwater blow-off. The required air/oxygen mixture was led into the oxygen intake port and the switch placed at the bag position.

A case of congenital lobar emphysema is described. This infant was on CPAP with the modified East-Radcliffe circuit for a total of 23 weeks. A modified method of fixation for the Tunstall endotracheal tube connector was also used. The child had a left upper lobectomy and ligation of ductus arteriosus, followed 3 months later by a right middle lobectomy. She is now alive and well.

## DOXAPRAM IN OUTPATIENT ANAESTHESIA

Dr. P.L. RIDDELL

With the increasing pressure on surgical departments to provide outpatient anaesthesia and ever increasing numbers of patients, it is essential that following anaesthesia patients should recover rapidly and require as little supervision as possible post-operatively. It has been shown that doxapram hydrochloride causes a significant reduction in recovery time when given intravenously at the end of a halothane based anaesthetic. In a previous Aberdeen study all patients were breathing 0.5 per cent halothane at the end of surgery and at the start of timing recovery. The aim of the present

study was to use an anaesthetic technique similar to that used in routine practice in which the majority of patients would not be receiving halothane at the end of surgery.

In a double-blind trial of one hundred outpatients receiving an anaesthetic sequence of methohexitone, nitrous oxide and halothane, significant shortening of recovery time was produced by doxapram hydrochloride given intravenously at the end of anaesthesia. The dosage of 80mg for females and 95mg for males gave comparable recovery times. There was no evidence that the administration of doxapram caused cardiac arrhythmias. It is suggested that doxapram used in this way is helpful in reducing patient supervision in the recovery area and increases the safety of recovery.

### LUNG FUNCTION DURING CAESAREAN SECTION

Dr. G. LYONS

Measurement of maternal blood gases, alveolar to arterial oxygen tension difference, calculated pulmonary venous admixture (physiological shunt) and dead space/tidal volume ratio (VD/VT) were made in a group of sixteen patients undergoing elective Caesarean section. A standard anaesthetic technique was used and all measurements were carried out after positioning the patient in left lateral tilt before delivery.

With a mean inspired oxygen concentration of 67%, the mean Pa O<sub>2</sub> was 326 m.m.Hg., (PA O<sub>2</sub> - Pa O<sub>2</sub>) was 139 mm Hg., VD/VT was 39.5% and physiological shunt was 3%.

### ANAESTHESIA IN HYPERBARIC ENVIRONMENTS

Dr. J.A.S. ROSS

Over the last ten years Aberdeen has become the major support centre for North Sea oil exploration and exploitation. Hand in hand with this industrial development has been a large increase in commercial diving of the British coastline. As members of an emergency surgical team we envisage a situation where a diver under pressure suffers an acute, life-threatening illness.

For many reasons it may be advisable to manage the patient through the acute stage of his illness at pressure. His management may require anaesthesia and/or artificial ventilation. In providing cover for such an eventuality, the problems are two-fold. First the provision of equipment capable of working in such an environment without endangering chamber occupants. Second, the usage of drugs which, by virtue of an increased hydrostatic pressure, may have unexplained properties.

### ANTARCTICA

Dr. M.D. HADLEY

As man has extended his quest for the earth's resources into remote and inhospitable environments; mainly in the last ten years, exploration medicine has reasserted itself internationally as a necessary field of research. The fundamental problems posed not only affect those involved in industry directly, but the whole community in view of the increasing use of the mountains, sea and air for recreation. To survive in these alien environments, man must modify the external climate by intelligent use of shelter, clothing and heating in order to maintain an internal tropical micro climate.

At present the British Antarctic Survey, a component body of the Natural Environment Research Council, is responsible for British scientific activities in the British Antarctic Territories and Falkland Island Dependencies. These territories comprise a total land area of about 660,000 sq. miles, all south of the Antarctic Convergence.

The survey employs up to four doctors to provide medical care for its five bases with a complement of sixty men in winter and up to two hundred in summer. The medical officers usually undertake a research programme related to the unique opportunity to study a captive group in an extreme environment. Through an association with Aberdeen University, time is spent under the supervision of Professor Norman and Col. Adam in the Institute of Environmental and Off-Shore Medicine here in Aberdeen for initial training in the broader fields of expedition medicine and surgery; anaesthetics and dentistry. Meanwhile

research projects complimentary to the Institute's laboratory work described in the next two papers are organised, thus allowing the doctors dry runs or control experiments before leaving for the Antarctic.

## THE OXYGEN REQUIREMENTS ASSOCIATED WITH SHIVERING DURING HYPOTHERMIA

Dr. C.D. AULD

It has been postulated that the increased oxygen requirements associated with shivering may not be met at low body temperatures. This is based on the effect of hypothermia on respiratory and cardiovascular function, and on the oxyhaemoglobin dissociation curve.

Oxygen demand and its subsequent utilisation were studied on the following animal model. 25 lightly anaesthetised adult mongrel dogs were divided into 2 groups and cooled by iced water immersion to a core temperature of 30°C. Group A were allowed to shiver throughout cooling, while Group B were relaxed and ventilated to an arterial pCO<sub>2</sub> in the range found in group A.

The metabolic response to cooling was greatly influenced by the presence of shivering as shown by the 300% increase in oxygen consumption. This was largely due to an increase in both cardiac output and oxygen extraction. A similar change in desaturation of haemoglobin suggested that the extracted oxygen was derived predominantly from oxyhaemoglobin. This took place at oxygen tensions which would probably suggest tissue hypoxia at normothermia. The absence of a lacticacidosis confirmed there was adequate tissue utilisation of oxygen to meet the increased oxygen demands associated with shivering despite the possible adversities of hypothermia.

## AIRWAY REWARMING

Mr. I.M. LIGHT

Central rewarming via the airway has been advocated as the most beneficial technique currently available for the active central rewarming of a victim of hypothermia.

The role of the airway was investigated with respect to respiratory heat transfer using adult mongrel dogs that were subjected to an identical cooling phase and then rewarmed using the following rewarming techniques.

(a) Hot water immersion at 42-44°C, (b) Airway rewarming and shivering with body insulation, (c) Shivering and body insulation and (d) airway rewarming with muscle relaxation (achieved by the use of I.V. pancuronium). Airway rewarming was initiated by means of a commercially available device known as the "Reviva".

Mid-oesophageal and rectal temperatures were measured in all groups as was respiratory heat loss or gain. Respiratory heat gain at best provided an additional heat component equivalent to some 20-25% of metabolic heat production.

Heat gain was found to be proportional to minute volume and is likely to become even less during hypothermia with depressed ventilation. The lung surface does not take up all the available heat presented as the expired air temperature is above core temperature.

The heat available from prevention of respiratory heat loss and addition of respiratory heat gain did not manifest itself either as a preferential rise in mid-oesophageal temperature compared to rectal in the airway rewarmed and shivering group or when compared to the core temperatures in the shivering alone group.

The component of respiratory heat loss is not significant in our environment but may be so in colder, less humid environments. In these conditions it may be worthwhile to prevent respiratory heat loss and this may help to prevent deterioration in the condition of the hypothermic casualty during such times as evacuation by providing total whole body insulation.

# News from the Regions

## Grampian Region

Most of the wards which were closed three years ago due to the nursing shortage have now re-opened, many with a reduced number of beds, some of the rooms being converted to day rooms and recovery areas. The beginning of the phased opening of the Stage II Block has again been postponed.

There have been several senior staff changes this year. Dr C.R. Dundas is now Senior Lecturer in Anaesthesia to the University of Aberdeen, and has been responsible for organising the Registrars Meeting this year, a report of which appears elsewhere. Dr A.W. Raffan, past President of the Society, retired this year and was entertained to dinner at the Broadstrak Inn. Dr W.I. Emslie, Medical Assistant, also retires this year after fifteen years in the Department. Dr Emslie was previously in General Practice in Kirkwall. To their successors, Dr D.G. Ross, Dr J.A.R. Pook and Dr R. Davidson Lamb, we extend a warm welcome in their consultant appointments.

The junior ranks have seen many losses, not only to general practice and to Canada as usual, but also to other fields of hospital work at home and to other posts overseas, e.g. Dr Alison MacIntosh to the Falkland Islands and Dr W.J. Ingram to the Solomon Isles. For those remaining, it has been a successful year in the examinations, and there has been no shortage of excellent applicants wishing to join us. Several Registrars and Senior Registrars have been seconded to other University departments both at home, e.g. Biochemistry, Paediatrics and Offshore Medicine, and overseas.

## Highland Region

It has been quite an eventful year in the Highland region, with one notable exception, that is the building of Phase II of the Inverness Central Hospital. The year has gone by without there being any progress on this project. Progress, however, is being made on new theatres for Raigmore, unfortunately at the time of writing this work has stopped but we are hopeful that before long workmen will return to the partially

completed building.

There have been quite a few changes in staff during the year. Dr Sheila White has started her new five session job with understandable enthusiasm. She is also showing enthusiasm for the other sessions which she spends in her new house in the Black Isle. The full-time consultant staff are soon to be joined by Dr John Machin who is no stranger to these parts and we look forward to his arrival and wish him well in his new post. Our Registrar, Dr Eileen Mills, has left to accompany her husband to Glasgow and also to produce her first child. We will miss her in the department, but her reasons for leaving seemed indisputable and she has our best wishes for the future. Her post of Registrar was taken by Dr Bill Kerr who gained promotion from S.H.O. and we welcome Dr Wendelin Beytes as our new S.H.O.

## Tayside Region

After many frustrating months of delay due to structural problems and lack of finance for nursing staff the new I.T.U. in Ninewells opened eventually in June 1977. The unit consists of 5 beds open plan with two large single rooms equipped with isolation facilities. There is also a large treatment room where minor surgical procedures can be carried out. The unit has its own office and laboratory accommodation and shares tutorial rooms, common rooms etc. with the C.C.U. The closer association between the departments of cardiology and anaesthesia is beneficial to both units, and we hope to improve recruitment and stimulate interest in anaesthesia and intensive care as a result of the allocation of a surgical resident H.O. to the unit on a rotating basis for 3 months.

Professor M.K. Sykes visited the department in May this year as guest lecturer of the Tayside Health Board. His open lecture entitled "Hypoxaemia due to drugs", and his stimulating lectures and tutorials as well as his informal advice, particularly to junior staff, were much appreciated by everyone.

There have been a few staff changes this year. We welcome Dr. Ann Staziker who succeeds Dr Soutar as consultant in the department and we

were sorry to lose Dr. Rennie back to the West, not only in her capacity as anaesthetist but as one of the outstanding golfers in the department.

Despite the general unease and despondency in the profession, we have had no difficulty in recruiting junior staff, particularly from among our own graduates. It is to be hoped that this will continue and that the results of the primary and final F.F.A. courses will continue to be as fruitful as they have been this year.

### Western Region

The award of the medal of the Faculty of Anaesthetists to Dr. H.H. Pinkerton and the conferring of the Honorary Membership of the Association of Anaesthetists to Professor A.C. Forrester are well deserved tributes to their outstanding work for our national associations, for anaesthesia in general, and for anaesthetists in the West of Scotland in particular, and has brought great pleasure to their many friends and colleagues.

Dr. Isobel Kirkwood has been elected to the Presidency of the Glasgow and West of Scotland Society of Anaesthetists, a role which she fulfils with her customary charm.

There has been the usual large number of changes in the Consultant ranks throughout the region. Dr. Albert Christie has retired from the Victoria Infirmary; Dr. Wanda Richards, Brian resigned from Stobhill Hospital to assume the important new role of Consultant-in-Charge of the Anaesthetic Department of the new Monklands District Hospital.

Dr. David Armstrong has retired as Senior Anaesthetist in Ayrshire and Dr. Graham McNab has become Chairman of the newly formed Division of Anaesthesia.

Drs. W.L.M. Baird, H.Y. Wishart and J. Macdonald have been elected to the Chairmanship of the Divisions at the Royal Infirmary, Western Infirmary and Southern General Hospital respectively.

Dr. Janet Easton has been translated from Stobhill Hospital to the Institute of Neurological Sciences; Drs. Peter Slater and Angus McKee have been appointed to Stobhill Hospital; Drs. Nancy Rennie, Helen Howie and Brian Stuart to the Victoria Infirmary; Dr. Wanda Richards, Brian Maule and Roderick McNicol to the Royal

Infirmary and Dr. John Henderson to the Western Infirmary; Dr. Stanley Zimmer will move shortly to Ayrshire as a Consultant and Dr. Arthur Davis will be returning from Peel Hospital to the Southern General Hospital.

On the academic front, Dr. Gavin Kenny has been appointed to a lectureship in anaesthesia at the Royal Infirmary, while our correspondent in that department reminds us also that Dr. Parbrook "had his disaster day" on 6th and 7th September. This cryptic communication does not conceal the fact of an outstanding workshop and study day on Planning for Disasters organised by Dr. Parbrook and including contributors and students from many parts of the country.

There is an easily identifiable rule that departments of anaesthesia may be found:

- (a) in attics
- (b) in basements
- (c) in wooden boxes in hospital gardens
- (d) in derelict houses within motoring distance of the hospital

The Western Infirmary, having been supported by (a) and (d), is about to house the combined University and Health Service Departments of Anaesthesia in an attractive potting-shed in a fashionable part of the garden. Not least among the attractions of the new building is the unique view from the Chairman's office of a secluded lawn on which (we understand) topless sunbathing is popular in summer.

Finally, we note with pleasure that recruitment to the speciality in the West of Scotland has never been better. The many vacancies which were available to be filled at the beginning of August 1977 were competed for by a gratifying number of high quality applicants.

### South East Region

There have been many changes in the senior staff in this region, particularly affecting the Royal Infirmary.

Dr. Alastair McKinlay retired because of ill-health and was succeeded by Dr. Gordon Drummond, a one-time SSA registrar prize winner. Dr. Drummond went to Montreal in the summer for one year.

Dr. Frank Holmes (Past President, SSA) retired at the end of September and has been succeeded

by Dr. Tony Wildsmith, also a SSA registrar prize winner.

Dr. David Butchers resigned from the National Health Service and emigrated to Sydney, Australia. He is succeeded by Dr. Nigel Malcolm-Smith.

The ACME committee revised the senior registrar complement in the Royal Infirmary from seven to eight and Dr. Andrew Norbury was appointed to this additional post. Dr. Walter Nimmo (another SSA prize winner) has succeeded to Dr. Drummond's lecturer post.

Dr. David Littlewood went to Worcester, Mass., USA (after a lot of visa problems) in June for one year; his locum is Dr. Van Hoonaker from Belgium.

Dr. Dick Davidson Lamb has been appointed consultant to the Aberdeen Hospitals from February.

Dr. Palethorpe resigned his registrar post and has emigrated to Australia.

Possibly as a result of these upheavals, Professor and Mrs. Robertson decided to visit their son and family in San Francisco this 'fall'. We understand he is not thinking of emigrating.

An area training sub-committee has produced two planned integrated training programmes one at S.H.O. and the other at Registrar levels. It is hoped that these will be phased in shortly. The additional senior registrar has produced an opportunity to start Senior Registrar Electives.

Just over a year ago, a new suite of theatres was opened at the Princess Margaret Rose Orthopaedic Hospital. They are proving very satisfactory. One theatre at the Royal Hospital for Sick Children has been upgraded and work has started at several hospitals installing the ducting to reduce atmospheric pollution. Work on Phase I of the RIE is proceeding apace. It is heartening to know that some money is being invested on capital items.



# Editorial

In a recent article in the British Journal of Hospital Medicine the view was expressed by a politician that if hospital doctors were paid the kind of salaries that would enable them to concentrate on their work without having to bother about matters of remuneration what the N.H.S. would gain in terms of output and morale would far outweigh the extra cost involved. I imagine that it would be hoping for too much to expect this view to be shared by the majority of the writer's colleagues at Westminster. Meanwhile as our financial status goes from bad to worse, it would appear that the nadir has been reached with the H.J.S.C.'s advice to Senior Registrars acting up as Consultants to insist on payment being made on the S.R. scale rather than the Consultants' scale to avoid suffering a reduction in their income. With a 10% ceiling on wage increases in operation, there is little likelihood that the coming year will see any great improvement in our financial position and it seems that the adequate pricing of the long awaited Consultant Contract is the only solution to our problem. We can but hope!

As with remuneration, the last few years have seen the gradual erosion of our status in the administration of the hospital service. Previously

the hospital Medical Staff Association was a body of some importance and influence and had ready access to the Hospital Board of Management. After three years of reorganisation, it is evident that we have been left with limited powers to deal with an extremely complex administrative set up. The various Medical Committees which were created to advise the new administration have no muscle and one frequently has the impression that the administrators use the medical advisory structure not for advice but merely to delay action on important matters. Currently the medical advisory structure is under review and one would hope for an improvement in the situation once this has been completed.

On reviewing past Newsletter editorials it would seem that there has been little change in our circumstances over the last ten years but one thing that has improved is recruitment to the specialty. At the present time it is excellent not only in quantity but also in the quality of recruits and it could be that if the anomalies already referred to in this editorial were corrected, many of them will be encouraged to stay on in this country on completion of their training.

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## **WILLIAM B. PRIMROSE** M.B., Ch.B., F.F.A.R.C.S., D.A.

Dr. W.B. Primrose died on the 6th of July, 1977, at the age of 85. He was formerly Senior Anaesthetist at Glasgow Royal Infirmary and President of the Scottish Society of Anaesthetists in 1935.

Dr. Primrose began his long service to the

specialty in 1925 when he was appointed visiting Anaesthetist to Glasgow Royal Infirmary, a post which he held until his retirement in 1957. During this period his contributions to anaesthesia were many and varied. He is perhaps best known for his work on carbon dioxide absorption and was one of the first to introduce closed circuit anaesthesia into clinical practice.

EDINBURGH & EAST OF SCOTLAND  
SOCIETY OF ANAESTHETISTS

SYLLABUS 1977-1978

Meetings will be held in the Royal College of Surgeons, Nicolson Street, Edinburgh, at 7.45 p.m. for 8 p.m. unless stated otherwise.

1977

Saturday, 29th October :

Combined meeting with Glasgow and West of Scotland Society of Anaesthetists in the Royal College of Physicians & Surgeons, 242 St. Vincent Street, Glasgow, at 5 p.m.

"The Royal College of Physicians and Surgeons of Glasgow". Professor T. Gibson, President of the Royal College of Physicians & Surgeons, Glasgow.

The meeting will be followed by an informal dinner.

Tuesday, 22nd November :

Presidential Address — Dr. R. Burtles

\*Tuesday, 13th December :

Professor J.W. Dundee : "The Anaesthetist and Clinical Pharmacology".

1978

Tuesday, 10th January :

Chief Inspector T. Thomson, Edinburgh City Police — "Drugs — Their Use and Mis-use in Relationship to Anaesthetists". This meeting will include a short film.

Tuesday, 21st February :

Dr. Ashcroft — "Transmitter Systems in the Human Brain".

Friday, 4th March :

Annual Dinner

Tuesday, 21st March :

Dr. H.W.C. Griffiths : "Chloroform — Friend or Foe". Dr. J. Murdoch : "Hepatitis and Halothane Anaesthesia".

Friday, 28th April :

Annual General Meeting

Parking is available in Chambers Street, South College and at Bristo Street Car Park at George Square.

\* Probable venue Kirkcaldy, Fife.

Further details of meetings, etc., from Dr. J. Wilson, 15 Campbell Rd., Edinburgh. Tel: 031-337 6763.

GLASGOW AND WEST OF SCOTLAND  
SOCIETY OF ANAESTHETISTS

CURRICULUM 1977-1978

1977

Thursday, September 22nd :

Golf Outing — Williamwood Golf Club — 2 p.m.

Saturday, October 19th :

Combined Meeting with Edinburgh and East of Scotland Society of Anaesthetists — in Glasgow. Speaker — Professor T. Gibson.

Thursday, December 1st :

Dr. A.A. Spence — "Authors, data and other variables".

1978

Wednesday, January 11th :

Dr. H. Simpson — "Chronobiology — a new perspective for Medicine".

Thursday, February 16th :

Members' Night — Presented by members from hospitals outwith Glasgow.

Tuesday, March 14th :

Presidential Address — Dr. I. Kirkwood

Tuesday, April 18th :

Annual General Meeting.

Unless otherwise stated, meetings will be held in the Royal College of Physicians and Surgeons of Glasgow, 242 St. Vincent Street, Glasgow, at 8.15 p.m.

Tea will be available at 7.45 p.m.

NORTH-EAST OF SCOTLAND  
SOCIETY OF ANAESTHETISTS

SYLLABUS 1977-1978

- Thursday, 6th October, 1977 : Stracathro  
"The Biological Significance of the  
Endorphines"  
Dr. J. Hughes, University of Aberdeen.
- Thursday, 3rd November 1977 : Aberdeen  
"Liver Transplantation"  
Dr. J. Farman, Addenbrookes Hospital.
- Thursday, 23rd March, 1978 : Stracathro  
Registrars Papers
- Thursday, 13th April, 1978 : Dundee  
"Man in Hostile Environments"  
Colonel J. Adam, University of Aberdeen.
- Thursday, 18th May, 1978 : Stracathro  
Annual General Meeting and Presidential  
Address  
Dr. B.R. Kennedy.

Meetings are held at 8 p.m. in Aberdeen Royal  
Infirmary, Ninewells Hospital and in Stracathro Hospital,  
Brechin, unless otherwise notified.

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