

Clinical Paediatric Surgery

Diagnosis and Management

BY THE STAFF OF THE
ROYAL CHILDREN'S HOSPITAL, MELBOURNE

EDITED BY

Peter G. Jones

AND

Alan A. Woodward

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... my purpose is here to doo theym
good that have moste nede, that is
to save, chyldren: and to share the
remedies that god hath created for
the use of man . . .

Thomas Phaire *The Boke of Chyldren* 1553

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Foreword to the First Edition

The progressive increase in the body of information relative to the surgical specialties has come to present a vexing problem in the instruction of medical students. There is not time in the medical curriculum to present everything about everything to them and in textbook material one is reduced either to synoptic sections in textbooks of surgery, or to complete and authoritative textbooks in the specialty too detailed for the student or the non-specialist.

There has long been a need for a book of modest size dealing with pediatric surgery in a way suited to the requirements of the medical student, general practitioner and pediatrician. Peter G. Jones and his associates from the distinguished and productive group at the Royal Children's Hospital in Melbourne have succeeded brilliantly in meeting this need. The book could have been entitled, 'Surgical Conditions in Infancy and Childhood', for it deals with the child and his afflictions, their symptoms, diagnosis and treatment rather than the surgery as such. The reader is told when and how urgently an operation is required, and enough about the nature of the procedure to understand its risks and appreciate its results. This is what students need to know and what pediatricians and general practitioners need to be refreshed on.

Many of the chapters are novel, in that they deal not with categorical diseases but with the conditions which give rise to a specific symptom; thus: Vomiting in the First Month of Life, The Jaundiced Newborn Baby, Surgical Causes of Failure to Thrive. The chapter on genetic counselling is a model of information and good sense.

The book is systematic and thorough. A clean style, logical sequential discussions and avoidance of esoterica allow the presentation of substantial information over the entire field of pediatric surgery in this comfortable-sized volume with well-chosen illustrations and carefully selected bibliography. Many charts and tables, original in conception, enhance the clear presentation.

No other book so satisfactorily meets the needs of the student for broad and authoritative coverage in a modest compass. The pediatric house officer (in whose hospital more than 50 per cent of the patients are, after all, surgical) will be serviced equally well. Pediatric surgeons will find between these covers an account of the attitudes, practices and results of one of the world's great pediatric surgical centers. The book comes as a fitting tribute to the 100th Anniversary of the Royal Children's Hospital.

MARK M. RAVITCH

*Professor of Pediatric Surgery,
University of Pennsylvania*

Preface to the Second Edition

There is a sense of gratification that one has produced something useful when a second edition is called for, and it also provides an opportunity to refine the text and bring it up to date. There have been some remarkable advances in paediatric surgery in the last five years and, as is not uncommon, some of the innovations have been found to have disadvantages which limit their application to very particular circumstances; total parenteral alimentation and intracardiac surgery in infancy are examples of these developments.

There have also been changes in nomenclature, among the most notable, steps towards an internationally acceptable classification of anorectal anomalies, an important categorization because of the implications in surgical management.

In the area of investigations, scintillography with radionuclides, ultrasonic echography and computerized axial tomography have earned a wider applicability, particularly in the tumours of childhood, but they are no more than mentioned here.

The most significant advance in children with extracranial solid tumours has been considerable improvement in survival rates from the extended use of cytotoxic agents in multiple combinations and in repeated courses continued for up to two to three years. These and other developments have been incorporated in this second edition and many changes have been made in all of the 68 chapters, 5 of which have been extensively or completely rewritten. Some of the illustrations have been replaced, and twenty new ones added. Despite this, the size of the book has been increased very little; hopefully, its usefulness has been maintained, and perhaps enhanced.

September 1976.

P.G.J.

Preface to the Third Edition

The objective which prompted the compilation of the first edition of this book was to bring together information on surgical conditions in infancy and childhood for the use of senior medical students and resident hospital staff. It has been a source of great satisfaction to the contributors to find that the book has proved useful, and a third edition has been required. Family doctors, paediatricians, and a wide spectrum of those concerned with the welfare of children in health centres, kindergartens, schools and children's wards have also, it seems, found it helpful.

A knowledgeable medical publisher recently said that this is not a book about surgery but about paediatrics, and perhaps that is what it should be, given the omission of almost all details of operative surgery—i.e. the 'what', while concentrating on the 'why' and 'when'.

As in all branches of medicine, there have been significant advances in many areas impinging upon paediatric surgery, notably in anaesthesia, in new techniques of imaging, oncology, and in the neonatal field, understanding of cardiopulmonary physiology, monitoring, and intensive therapy. A preface is, perhaps, not the best place to speculate about the future of the specialty, but ultrasonography has made such strides that an increasingly long list of developmental anomalies can now be identified with increasing accuracy. Prepartum ultrasound is already applied in 85–90% of pregnancies in developed countries as a basis for elective termination, but also pointing the way to expeditious correction after delivery and, potentially, palliative or corrective surgical procedures on the fetus *in utero*.

The plan of the first and second editions remains unchanged, but every chapter has been updated, and several completely re-written. Cardiac surgery for developmental abnormalities has developed to such an extent that it is no longer within the scope of this book, and hydatid disease in children is now so rare that the chapter devoted to it has been deleted.

A feature of this edition is that a number of excellent chapters written by contributors who have now retired from active practice have been brought up to date by their successors, as indicated in the list of contributors. Another reflection of the passage of time and the needs of the future is the addition of a co-editor, Alan Woodward, who has brought a fresh approach and assessment to the book as a whole. We hope that the third edition will prove to be as useful and useable as its predecessors.

P.G.J.

A.A.W.

January 1986

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Many members of the Royal Children's Hospital community have made valuable contributions to this book.

We are indebted to successive Directors of Radiology, and their department, who supplied the radiographs from their teaching files; the artist, Mrs Vivienne James; and the staff of the Educational Resources Centre. All these contributors have produced work of a very high standard.

We are also grateful to our senior colleague Dr Reginald Webster, Burton Research Fellow in Pathology, who exercised his gentle erudition in a successful search for syntactic solecisms in the first edition.

Finally we would like to express our gratitude to Mr Mark Robertson of Blackwell Scientific Publications (Australia) for bringing this edition to fruition.

Contents

	Contributors	viii
	Foreword by Mark M. Ravitch	xi
	Preface to Second Edition	xii
	Preface to Third Edition	xiii
	Acknowledgements	xiv
1	Transport to hospital	1
2	Genetic counselling	8
3	The child in hospital	16
4	The timing of surgical procedures	21
5	The care of the newborn before and after surgery	30
6	Respiratory distress in the newborn	40
7	The management of acute respiratory failure	51
8	Oesophageal atresia	58
9	Vomiting in the first month of life	63
10	Neonatal intestinal obstruction	72
11	Causes of neonatal intestinal obstruction	76
12	Anorectal anomalies	95
13	Spina bifida	107
14	The infant with a large head	120
15	Exomphalos and gastroschisis	127
16	The jaundiced newborn baby	133
17	Surgical causes of failure to thrive	137
18	Infections	141
19	Congenital abnormalities of the cranium	152
20	Intracranial tumours	158
21	Ocular conditions	165
22	The ear, nose and throat	190
23	The mouth and pharynx	201
24	The lip, palate, face and ears	207
25	Swellings in the neck	217
26	The umbilicus	229
27	Abdominal emergencies	234
28	Recurrent abdominal pain	254
29	Bleeding from the alimentary canal	257
30	Inflammatory bowel disease: colitis and ileitis	268
31	Constipation and its sequelae	276
32	The child with an abdominal mass	282

33	The spleen, pancreas and bile ducts	289
34	The inguino-scrotal region	297
35	Inguinal hernias and hydroceles	305
36	Undescended testes	314
37	The anus, rectum and perineum	321
38	The external genitalia	329
39	Ambiguous sexual development	338
40	The renal tract: infection and calculi	343
41	The child with haematuria	355
42	The upper urinary tract	359
43	The lower urinary tract	367
44	The child with 'wetting'	376
45	Vascular and pigmented naevi	387
46	The breast	392
47	Deformities of the chest wall	395
48	Diaphragmatic hernia	403
49	The lungs and pleura	409
50	The child with a mediastinal mass	420
51	Deformities	425
52	Posture and gait	446
53	The child with a limp	451
54	Bone cysts and tumours	460
55	Trauma in childhood	467
56	Head injuries	479
57	Abdominal and thoracic injuries	488
58	Fractures in childhood	494
59	The hand	502
60	Foreign bodies	506
61	The ingestion of corrosives	515
62	Burns	517
63	Malignancy in childhood	524

APPENDIXES

I	The urgent management of paediatric surgical problems	529
II	Paediatric normal values	536
III	Parenteral nutrition	549
IV	Instructions concerning plaster casts	552
V	Instructions concerning head injuries	553
VI	Venomous bites and stings—poisonous plants	554

Index	557
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1 Transport to hospital

General principles

Transport of a critically ill patient is a precarious undertaking, and the following principles should be followed:

- 1 Whenever possible the patient's condition should be stabilized before embarkation.
- 2 The most experienced/qualified personnel available should *accompany the patient*, and when specialized 'retrieval' services exist, these should be used.
- 3 Transport should be as rapid as possible, but without causing further deterioration or incurring unnecessary risks to patient or transporting personnel.
- 4 Transport early rather than late.
- 5 Prepare and check items of equipment before setting out.
- 6 Communicate ahead with receiving institution so that additional staff and equipment are prepared for arrival.

Selection of patients

Three groups of paediatric surgical patients require transfer:

- 1 Newborn infants with developmental anomalies.
- 2 Infants and children with serious injuries.
- 3 Infants and children with extensive burns.

NEONATAL EMERGENCIES

A list of the more common emergencies is given in Table 1.1. Most infants with these conditions should have transport arranged *as soon as the diagnosis is apparent or suspected*; however, in some (e.g. small, covered meningocele) transport may be delayed to allow the mother–infant attachment to develop, or until convenient, less urgent, arrangements for transport can be made.

Some developmental anomalies do not require transportation, and specialist consultation at the hospital of birth may suffice (e.g. cleft lip and palate,

Table 1.1. Neonatal surgical conditions requiring transportation

Obvious malformations	Exomphalos/gastroschisis Myelomeningocele/encephalocele Imperforate anus
Respiratory distress	
(a) Upper airway obstruction	Choanal atresia Pierre-Robin syndrome
(b) Pulmonary disease	Emphysematous lobe
(c) Lung compression	Pulmonary cyst(s) Pneumothorax Diaphragmatic hernia
Congenital cardiac abnormalities	
Acute alimentary or abdominal emergencies	Oesophageal atresia Intestinal obstruction Necrotizing enterocolitis Haematemesis and/or melaena

orthopaedic anomalies). Where doubt exists concerning the advisability or timing of transportation, specialist advice should be sought.

SERIOUS INJURIES

Children with complicated or multiple injuries, in particular paraplegia or those requiring *intracranial or thoracic surgery*, present a difficult problem. Resuscitation and stabilization are the prime considerations, remembering that blood volume expanders (SPPS and crystalloid solutions) are more readily available than cross-matched blood.

Because of the infinite variety of circumstances, no dogmatic rules can be laid down; each patient must be considered individually and any one of several factors may be decisive, the most important are the *condition of the patient* and the *distance or duration of the journey*.

BURNS

Children of any age with *burns of more than 20% of the body surface* probably have a better chance of survival in an established burns unit, depending on the facilities available locally. *Transfer within 4 h* of the injury is preferred, and provided the patient reaches the destination within this time, no intravenous fluids need be given in transit.

If the decision is delayed, or the journey is longer and the destination cannot be reached in less than 6–8 hours from the time of the burn, *intravenous* resuscitation with a plasma volume expander should be commenced before the journey begins; the volume to be given in transit can be calculated from the recommendations on page 36. It is almost impossible to give too much plasma volume expansion to such a patient.

Transportation

CHOICE OF VEHICLE

The choice between road ambulance, helicopter or fixed-wing aircraft will depend on distance, availability of vehicle, time of day, traffic conditions, airport facilities and weather conditions. In general, fixed-wing aircraft offer no time advantage for transfers of under 160 km (100 miles).

Patients with entrapped gas, e.g. pneumothorax or significant abdominal distension, *should not travel by air*; if air travel is mandatory, special provision must be made to *fly at low levels* if the aircraft is unpressurized, to avoid expansion of the trapped gases with decrease in ambient atmospheric pressure.

LIAISON

In transporting infants and older children, liaison can be crucial to survival, but is also important in expediting treatment.

With the receiving unit. Any change in the patient's condition should be reported to the receiving unit in advance of arrival. Detailed documentation of the history, and written permission for treatment including surgery should be obtained, together with the results of relevant test and X-rays. Neonates require 10 ml of maternal blood to accompany them, as well as cord blood and the placenta if available.

With the transport team. Details of stabilization procedures can be discussed with the headquarters of the transport team if difficulties arise while awaiting the arrival of the transport team.

With the parents. Written permission for transport is required. A full explanation of what has been arranged and why, and an accurate prognosis (leaning to the optimistic side) should be given to the parents, who should be allowed as much access as possible to the infant or child prior to transport. It is of great benefit for the parents of a newborn infant to have a 'Polaroid' photograph of the infant, taken before departure or at admission to hospital, if they are to be separated from the infant.

Equipment required

Major items of equipment carried by the specialist transport services in Victoria are shown in Table 1.2. If a specialized retrieval team is not available, the following basic equipment is required:

Newborn infants require a portable *incubator* which operates from the ambulance battery or a self-contained source. A *thermometer* is essential; protection against cold stress can be aided by the use of *bubble plastic* sheets, plain plastic wrap or baby blankets.

An adequate supply of oxygen must be taken; cylinders must be carefully immobilized, and the volume required is calculated from the flow rate and the estimated time of transport (+ 50% for unexpected delays) (Table 1.3).

Suction for clearing secretions is required; care is required with the suction provided for adult transport in ambulance vehicles, and *low suction pressures* should be used, especially for neonates. Controlled suction can be provided by the use of an *oral mucus extractor*.

Table 1.2.

Neonatal transport Newborn emergency transport service	Paediatric transport Paediatric emergency transport service
Transport incubator	Medical oxygen in sufficient supply
Oxygen and air cylinders	to administer by mask, catheter,
Gas heater/humidifier	headbox, endotracheal tube or
12 V battery	tracheostomy tube
Battery powered respirator	Suction apparatus and appropriate
Cardiac monitor	suction catheters
I.V. infusion pumps	Equipment to administer positive
Oxygen concentration analyser	pressure ventilation by bag, mask and
Temperature monitor	oropharyngeal airway
Suction apparatus	Equipment to intubate trachea and to
Transcutaneous PO ₂ monitor	mechanically ventilate
Blood pressure gauge	Equipment to secure endotracheal/
Glucometer (for Dextrostix)	tracheostomy tube and to provide
Transilluminator	adequate humidification to prevent
Polaroid camera	tube blockage
Hand ventilation apparatus	Intravenous cannulae and fluid
Minor surgical kit	administration equipment
Requirements for: intubation	Blood pump
i.v. infusion	Supply of colloid and crystalloid
umbilical catheterization	solutions
pneumothorax drainage	Means to measure blood pressure and
Disposable items: syringes	count pulse and respiration
needles	Drugs, syringes and needles
feeding and suction	Naso-gastric tubes
catheters	ECG/Defibrillator
Drugs	