CIRCULATION
AN OFFICIAL JOURNAL OF THE AMERICAN HEART ASSOCIATION

EDITOR-IN-CHIEF
Herrman L. Blumgart, Boston, Mass.

EDITORS
Edith E. Parris, Assistant Editor
Paul M. Zoll, Boston, Mass.

ASSOCIATE EDITORS
Stanford Wessler, Boston, Mass.

EDITORIAL BOARD

Wright R. Adams, Chicago, Ill.
E. Cowles Andrus, Baltimore, Md.
Benjamin M. Baker, Baltimore, Md.
William B. Bean, Iowa City, Iowa
Richard J. Bing, Detroit, Mich.
Stanley E. Bradley, New York, N. Y.
Eugene Braunwald, Bethesda, Md.
Bernard B. Brodie, Bethesda, Md.
Daniel A. Brody, Memphis, Tenn.
Howard B. Burchell, Rochester, Minn.
J. Scott Butterworth, New York, N. Y.
André Cournand, New York, N. Y.
Jefferson M. Crismon, Stanford, Calif.
Paul M. Densen, New York, N. Y.
Albert Dorfman, Chicago, Ill.
Charles T. Dotter, Portland, Ore.
Jesse E. Edwards, St. Paul, Minn.
Ludwig W. Eichna, Brooklyn, N. Y.
Mary Allen Engel, New York, N. Y.
A. Carlton Ernsteine, Cleveland, Ohio
M. Irene Ferrer, New York, N. Y.
A. Stone Freedberg, Boston, Mass.
David C. Freiman, Boston, Mass.
Harry Goldblatt, Cleveland, Ohio
Robert E. Gross, Boston, Mass.
Sibley W. Hoobler, Ann Arbor, Mich.
Louis N. Katz, Chicago, Ill.

Aaron Kellner, New York, N. Y.
John W. Kirklin, Rochester, Minn.
Charles E. Kossmann, New York, N. Y.
John H. Laragh, New York, N. Y.
Howard P. Lewis, Portland, Ore.
Arthur J. Linenthal, Boston, Mass.
H. M. Marvin, New Haven, Conn.
Gordon K. Moe, Utica, N. Y.
Felix E. Moore, Ann Arbor, Mich.
Andrew G. Morrow, Bethesda, Md.
Raymond D. Pruitt, Houston, Texas
Oscar D. Ratnoff, Cleveland, Ohio
Dickinson W. Richards, New York, N. Y.
Mindel C. Sheps, Pittsburgh, Pa.
Sol Sherry, St. Louis, Mo.
Albert Sjoerdsma, Bethesda, Md.
Eugene A. Stead, Jr., Durham, N. C.
Samuel A. Talbot, Baltimore, Md.
Helen B. Taussig, Baltimore, Md.
Lewis Thomas, New York, N. Y.
William B. Wartman, Chicago, Ill.
Park W. Willis III, Ann Arbor, Mich.
Earl H. Wood, Rochester, Minn.
Irving S. Wright, New York, N. Y.

D. B. Zilversmit, Memphis, Tenn.


PUBLICATIONS COMMITTEE, AMERICAN HEART ASSOCIATION

Charles A. R. Connor, Chairman

Sims Gaynor
New York, N. Y.

Hans H. Hecht
Salt Lake City, Utah

New York, N. Y.

Paul H. Lavietes
New Haven, Conn.

Kurt Hirschhorn
New York, N. Y.

W. Henry Russell
Mount Kisco, N. Y.

Ralph E. Knutti
Bethesda, Md.

Donald C. McGraw, Jr.
New York, N. Y.

George E. Wakerlin, Medical Director, American Heart Association, New York, N. Y.

Walter H. Pritchard
Cleveland, Ohio

E. Cowles Andrus
Baltimore, Md.

Herrman L. Blumgart
Boston, Mass.

EUGENE M. LANDIS
Boston, Mass.
urine and secondary iron-deficiency anemia. The effects on iron metabolism were extensively analyzed by Sigler and associates\(^2\) and are also discussed in the current issue of this journal.\(^4\) The role of iron therapy in the milder cases is of considerable interest: in Sigler's case 3 and in Sanyal's case,\(^4\) iron plus some degree of spontaneous remission has made it possible to avoid the serious hazards of reoperation. Zinkham,\(^5\) however, has pointed out that "Even though iron therapy might keep the anemia at a so-called tolerable level, hemolysis would continue and the amount of hemosiderin deposited in the kidneys would increase so that the patient might develop irreversible renal damage. Consequently the ultimate in therapy in this disorder might not be maintenance of adequate hemoglobin levels but prevention of renal damage."

Efforts to understand the mechanism of hemolysis have given rise to elaborate discussions of turbulence, and the somewhat fanciful sobriquet of "Waring blender" syndrome was once used. The rare, successfully reoperated cases suggest that a combination of factors is needed, namely, a high pressure jet of blood such as may be ejected through a residual mitral cleft and an exposed or inadequately endothelialized area of Teflon, no matter how small, impinging on by this jet. If this concept is correct, the virtual absence of such anemia in the many other patients now sporting intracardiac Teflon becomes reasonable. The correctness of the term "exposed" and the role, if any, of turbulence are still debated and probably require further experimental elucidation.

The difficulties of correct diagnosis of this anemia may be compounded in severe cases by the presence of fever, splinter hemorrhages, and cardiomegaly, leading to diagnosis of endocarditis, pump fever, post-pericardiotomy syndrome, and the like: the most useful single finding appears to be the massive hemosiderin deposits in the urine although the eager and cooperative hematologist will perform many additional and relatively atraumatic studies.

This rare complication will shortly, one hopes, pass into history and be seen no more; in the meantime it has added yet another to the handicaps of the patient with an endocardial cushion defect.

**Catherine A. Neill, M.D.**

**References**

3. **Holman, A.:** Personal communication.
5. **Zinkham, W. H.:** Personal communication.

**The Complexity of Medicine**

Medicine is a composite subject. One of its elements is an experimental science, but a large part of it obeys the very different discipline of a practical art. In consequence it has often to deal with and act upon incompletely definable situations, and to develop the faculty of practical judgement on imperfect evidence—an activity characteristically absent from an experimental science. As long, therefore, as medicine continues to be so largely an activity of a non-scientific kind, every faculty of the active, rational mind is to be desired in the practice of it.—*The Collected Papers of Wilfred Trotter, F.R.S.* London, Oxford University Press, 1946, p. 154.
ther by the iron-deficiency state; to high-output cardiac failure with dilatation of the heart; to increased regurgitation resulting in an increased rate of hemolysis. Bringing the hemoglobin and hematocrit levels to normal by blood transfusions and maintaining it by iron therapy appears to have broken the cycle in our patient.

At present, 19 months after surgery and 12 months since her acute episode of congestive cardiac failure, the patient is in a state of clinical remission. Her serum iron level and the iron-binding capacity are normal. There is still, however, laboratory evidence of compensated hemolysis, namely, an elevated reticulocyte count, the presence of hemosiderin in the urine, and shortened red-cell survival time.

Correction of any existing anemia and maintenance of hemoglobin and hematocrit at normal relative levels by repeated blood transfusions or iron therapy, as required, would appear to be an important factor in the management of these cases.

A high mortality rate has been observed in the cases that have been subjected to second operation.1-4 The good response to adequate management of anemia and congestive cardiac failure in two cases,2 including the one under discussion, indicates that vigorous medical management should be given an adequate trial before resorting to reoperation.

Conclusion

A case of hemolytic anemia that developed after open-heart surgery has been presented. The hemolysis appears to be mechanical in origin, caused by regurgitation of blood against the Teflon patch. The patient showed evidence of iron-deficiency anemia, which, by further aggravating the chronic hemolytic anemia, led to high-output cardiac failure, progressive dilatation of the heart, increased mitral regurgitation, and a greater impact of a high-velocity regurgitant jet of blood against the Teflon patch, resulting in more hemolysis. Correction of the anemia by blood transfusions and iron therapy broke the vicious cycle. Thus, intensive medical management to maintain hemoglobin and hematocrit at normal levels should be given a fair trial before resorting to reoperation.

Acknowledgment

The authors wish to thank Drs. Nelson K. Ordway, J. R. Bove, and D. H. Clement for their critical review of this manuscript. We would like to express our appreciation to Drs. Hukill and Finch, who kindly examined the urine for hemosiderin, and to Dr. Catherine Neill, Department of Pediatrics, The Johns Hopkins University School of Medicine, for some very valuable suggestions.

References


Acquire the art of detachment, the virtue of method, and the quality of thoroughness, but above all the grace of humility.—Sir William Osler. Aforisms From His Bedside Teachings and Writings. Edited by William Bennett Bean, M.D., New York, Henry Schuman, Inc., 1950, p. 68.


"Doctor’s Medicine"

In addition to the judicial function there is also a vast area of activity that reaches into our individual lives and within which a lawyer may and does give advice to his client and acts in his behalf. This has been called “lawyer’s law.” In a similar manner a physician advises and works for his patient. This could be called “doctor’s medicine”—if not confused with some mixture in a bottle. One may lose confidence in a lawyer, but not in the law; in a doctor or in what is in the bottle, but not in medicine as an institution. Were we to renounce our confidence in government under law, our society would revert to anarchy or totalitarian dictatorship; loss of confidence in medicine as an institution would expose us to the plagues and pestilence of the Middle Ages and very likely carry us back to some primitive tribal way of life.—Introduction, Edward D. Churchill, M.D. Listen to Leaders in Medicine. Edited by Albert Love and James Saxon Childers. Atlanta, Tupper and Love, Inc., 1963, p. 4.
Cases Illustrative of Appearances in Diseases Terminating in Dropsical Effusion

Case I. John King, aet. 34, was admitted October 12, 1825, into the Clinical ward of Guy’s Hospital, under my care. He had been a sailor till within the last four years, and was accustomed to take considerable quantities of spirits. . . . He was pale, and of an unhealthy appearance.

About three weeks before admission he was seized with pain in his loins, knees, and ankles;—his legs soon became much swollen, and his hands and face occasionally oedematous. When admitted, the abdomen was painful on pressure. Pulse 78, rather hard; tongue natural, but pale. . . . Urine scanty, about one pint in twenty-four hours. Appetite good. . . .

Urine scanty, but clear and of a natural colour. Great tenderness in the upper part of abdomen, which, he says, came on since the morning. On percussion the right side of the chest is more sonorous than the left, which is rather dull. By assistance of the stethoscope I thought the sound of the heart’s beat was as if performed through fluid. . . .

He died a few hours after the visit.

Sectio Cadaveris.—Nov. 30th.

In this case we have a very well marked example of a granulated condition of the kidneys, connected with the secretion of coagulable urine. If we can form any judgement of the priority of disease from the more advanced state of organic change, we shall be inclined to consider that the disease in the kidney was first established, and had probably laid the foundation for that effusion into the cellular membrane which had taken place previously to his admission. . . .

The organization of the liver and its functions, as far as any means of judging could be afforded by inspection after death or observation during the progress of the disease, remained unimpaired to the very last; and the morbid appearances of the heart were of a nature to evince recent inflammatory action on the pericardium, and not that state of disease which has commonly been observed in connexion with general dropsical effusion. . . .

The dingy colour occasionally communicated to the urine in this case by admixture of blood, serves further to connect it with the other cases of dropsy with diseased kidney which I have seen.—Original Papers of Richard Bright on Renal Disease. Edited by A. Arnold Osman. London, Oxford University Press, 1937, pp. 5-10.
via the percutaneous femoral route, that is, 12.3 per cent versus 31.9 per cent agrees with the reports of McGraw, who noted one major complication in 281 abdominal aortograms via this route and three major complications in 28 thoracic aortograms done via this route. The major technical differences between these two procedures refer to the length of the catheter used and to the amount of radiopaque medium used. An analysis of catheter diameter and types of radiopaque medium used and ages of the patients did not show any correlation with the complication rate. The occlusive complications in the extremities can be placed into two general etiologic groups: those due to hemorrhage with subsequent pressure on the artery resulting in occlusion and those due to thrombosis or embolism or both either in situ or distal to the site of the puncture. The incidence of occlusions in thoracic aortograms done via a brachial artery cut down was very high (65.6 per cent), and three of 32 patients in this series had persistent hand and arm claudication.

Aortography is a procedure that requires hospitalization and cannot be done as safely as an outpatient procedure. Patients should be informed of the approximate type and degree of risk of aortographic procedures before these procedures are done. All patients must be observed closely after the procedure by a physician who is familiar with vascular problems. When an acute arterial occlusion develops during or after the procedure, it should be treated with vasodilators, warm environment, and a slightly dependent position of the affected extremity. When hemorrhage appears to be controlled and is not a significant part of the problem, consideration should be given to the use of anticoagulant drugs in addition to the above measures. Facilities should be available for prompt vascular surgery should this be required.

References

Constituents of Medicine
The constituents of which medicine is made up are readily discernible; they are three—a practical art, an applied science, and an experimental science.—The Collected Papers of Wilfred Trotter, F.R.S. London, Oxford University Press, 1946, p. 157.
from the first to the eighth clinical dialysis, suggesting a relationship to progressive malnutrition observed in this case.

Acknowledgment

We are indebted to Mrs. Clarise B. Nelson, Mrs. Ruth F. Aronson, and Miss Kathleen Skelley for their expert technical assistance.

References


William Heberden 1710-1801

William Heberden, the elder (1710-1801) B.A., St. John’s College, Cambridge, 1728; senior fellow, 1749; M.D. 1739, F.R.C.P., 1746; Goulstonian (1749) and Croonian Lecturer (1760); Harveian Orator (1750) and censor, F.R.S. 1749; practiced in London from 1748; first described angina pectoris; attended Johnson, Cowper and Warburton. His works (edited in Germany by Soemmering) include, "Commentarii de Morborum Historia et Curatione," and contributions to Transactions of the College of Physicians and Royal Society.

Scientific Hypothesis

In reality, it is not the pomp of language, the "whistling of a name," or the simplicity or ingenuity of a pathological theory, that can long give it currency with mankind. The sole point is, whether it is a just arrangement of actual phenomena, of which the operation of remedies form an indispensable part. If it does not include these operations, it is defective; if it is inconsistent with what is known of them, it is mischievous. By this test every medical work ought to be tried, and by it the present work must stand or fall.—Preface, Bath, October, 1811. Collections from the Unpublished Medical Writings of the Late Caleb Hillier Parry, M.D.F.R.S. Vol. I., London, Underwoods, Fleet-Street, 1823, p. 55.
analyzed in detail and compared with the findings in series of normal subjects.

The midportions of the horizontal plane QRS loops were found to be significantly more posterior in orientation. Posterior voltage was increased while maximum QRS voltage was decreased.

It was thought that the findings represent early right ventricular hypertrophy, and quantitative criteria to differentiate these loops from normal are suggested.

References

Pathologic Physiology of Angina Pectoris

The explanation of the causation of angina pectoris by coronary disease was, as pointed out by Osler, given by Allan Burns (1781-1813), the Glasgow anatomist and surgeon, who in 1809 ascribed the symptoms to anæmia, or as it might now be expressed anoxaemia, of the heart muscle resulting from coronary obstruction. This conception is now known as intermittent claudication—a term introduced by Bouley in 1831 in regard to horses and applied to man by Charcot in 1858—and perhaps more intelligibly as intermittent limp.—Sir Humphry Davy Rolleston. The Harveian Oration. Great Britain, Cambridge University Press, 1928, p. 88.


Lord Joseph Lister—Research and Animal Vivisection

Dear Sir: London, 4th April 1898

I am grieved to learn that there should be even a remote chance of the Legislature of any State in the Union passing a bill for regulating experiments upon animals.

It is only comparatively recently in the World’s history that the gross darkness of empiricism has given place to more and more scientific practice; and this result has been mainly due to experiments upon living animals. It was to these that Harvey was in large measure indebted for the fundamental discovery of the circulation of the blood, and the great American triumph of general anesthesia was greatly promoted by them. Advancing knowledge has shown more and more that the bodies of the lower animals are essentially similar to our own in their intimate structure and functions; so that lessons learned from them may be applied to human pathology and treatment. If we refuse to avail ourselves of this means of acquiring increased acquaintance with the working of that marvellously complex machine, the animal body, we must either be content to remain at an absolute standstill or return to the fearful haphazard ways of testing new remedies upon human patients in the first instance which prevailed in the dark ages.

Never was there a time when the advantages that may accrue to man from investigations in the lower animals were more conspicuous than now. The enormous advances that have been made in our knowledge of the nature and treatment of disease of late years have been essentially due to work of this kind.—Lister.

Don't touch the patient—state first what you see; cultivate your powers of observation.—SIR WILLIAM OSLER. Aphorisms From His Bedside Teachings and Writings. Edited by William Bennett Bean, M.D. New York, Henry Schuman, Inc., 1950, p. 33.

Circulation, Volume XXX, December 1964


William Withering

"The Botanical Professor gives annually a gold medal to such of his pupils as are most industrious in that branch of science. An incitement of this kind is often productive of the greatest emulation in young minds, though, I confess, it will hardly have charm enough to banish the disagreeable ideas I have formed of the study of botany."

This was written by William Withering in a letter to his parents in 1764, when he was a medical student at Edinburgh. He was then twenty-three years of age and it is not a little remarkable that such a statement should have been made by one destined to be one of the greatest of botanists and perhaps the greatest of medical botanists. As a botanist it may be said that he flowered late, for he did not begin the study of that science until he was about thirty years old.—Louis H. Roddis, M.D., William Withering: The Introduction of Digitalis into Medical Practice. New York, Paul B. Hoeber, Inc., 1936, p. 1.
from extravasation of contrast material into the posterolateral wall of the left ventricle during selective left ventricular cineangiography via the transseptal approach. The patient developed anterior upper chest pain, runs of idioventricular rhythm followed by spontaneous return to sinus rhythm with elevated ST segments, and increase in serum transaminase levels. Lack of previous reports of transient myocardial damage secondary to extravasation of contrast material, increased possibility of such accidents with increased use of selective left ventricular angiography, and possible preventive methods were emphasized.

Acknowledgment
We are grateful to Dr. Richard A. Bloomfield for referring the patient for study and for follow-up information.

References

Emergency
With whatever romantic notions we enter upon the practice of medicine, we shall probably find when we are actually engaged in it that but a small part of our time is taken up by the desperate or even the moderately urgent emergency. Nevertheless, it may be said without undue straining of the phrase that in a certain sense the whole of a doctor's life is passed in a medium from which the pressure of emergency is never remote. He may be described, perhaps not too extravagantly, as living to some degree like a soldier in an unfriendly country, where his whole behaviour must be alert and circumspect, and his reaction to events under careful control.—The Collected Papers of Wilfred Trotter, F.R.S. London, Oxford University Press, 1946, p. 1.
Reports of Medical Cases, With a View of Illustrating the Symptoms and Cure of Diseases

By Richard Bright—1827

In this case we have another decided instance of anasarca with coagulable urine connected with disorganization of the kidneys. The long continuance of the symptoms before the patient became the subject of treatment, the very scanty secretion of urine and its coagulable nature, and the comparative freedom from disease either in the thorax or the liver, led me from the first moment I saw him to anticipate that he would not recover: and the belief that the kidneys would be found the marked seat of disease, induced me to pay attention to the progress of the symptoms, though the case was not under my own care. The result fully justified my expectations: and the peritoneal inflammation and more acute pleuritic attack which appeared to hasten his dissolution, afford but fresh proofs of the disposition which exists in this disease to severe inflammatory affection of different structures, but more particularly of the serous membranes.—*Original Papers of Richard Bright on Renal Disease*. Edited by A. Arnold Osman. London, Oxford University Press, 1937, p. 19.


Chorea.—May 7, 1812. Miss C., aged nineteen, from the time of her birth till she was fourteen years of age, enjoyed good health...

Between four and five years ago the present patient began to suffer great debility, and shortness of breath, which were now and then accompanied with some degree of chorea, throughout the whole body. This complaint has increased till the present time, varying, however, at different periods, as to its force, and not obtaining any essential or permanent relief from Ether, Camphor, blisters on the head and other parts, a seton in her neck, the cold bath, sea bathing, warm bathing, &c. . . .

Miss C. now left Bath with the following instructions:—1st. Wholly to abstain from spirits and fermented liquors; to eat meat only once a-day, and always to eat less than her appetite demanded.

2dly. To walk every day as far as her strength would permit, avoiding the heat of the day.

3dly. To have four leeches applied once a week to the temples, encouraging the subsequent discharge of blood by washing the orifices with lukewarm water.

4thly. To employ a cold shower bath every other morning before breakfast.

5thly. To keep her hair constantly close cut.

6thly. To persevere for a month in the use of the pills last prescribed.—Collections from the Unpublished Medical Writings of the Late Caleb Hillier Parry, M.D.F.R.S. Vol. I., London, Underwoods, Fleet-Street, 1825, pp. 588-590.

Circulation, Volume XXX, December 1964
such an operation is bound to be hazardous, it may be inevitable to prevent deterioration.

Summary

The diagnosis of a patient with total anomalous pulmonary venous drainage into the left innominate vein associated with transposition of the great vessels is described. It is suggested that the characteristic "cottage-loaf" cardiovascular shadow is absent because transposition of the great vessels leads to pulmonary oligemia, in contrast with the increased pulmonary blood flow that is present when the great vessels are not transposed with this type of abnormal pulmonary venous drainage.

References


Methodology of Science

Can we hope to be guided in the right way by experience when there exist theories (such as classical mechanics) which to a large extent do justice to experience, without getting to the root of the matter? I answer without hesitation that there is, in my opinion, a right way, and that we are capable of finding it. Our experience hitherto justifies us in believing that nature is the realization of the simplest conceivable mathematical ideas. I am convinced that we can discover by means of purely mathematical constructions the concepts and the laws connecting them with each other, which furnish the key to the understanding of natural phenomena. Experience may suggest the appropriate mathematical concepts, but they most certainly cannot be deduced from it. Experience remains, of course, the sole criterion of the physical utility of a mathematical construction. But the creative principle resides in mathematics. In a certain sense, therefore, I hold it true that pure thought can grasp reality, as the ancients dreamed.—Albert Einstein. Essays in Science. New York, Philosophical Library, Inc. 1934, p. 17.