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ORIGINAL MEMOIRS.

THE END RESULTS AFTER TOTAL EXCISION OF THE SCAPULA FOR SARCOMA.*

WITH STATISTICAL TABLES

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SOME thirty or more years ago, one of the most distinguished of English surgeons, the late Sir John Eric Ericson, is credited with saying that we had practically reached finality in surgery—that there were no new fields to conquer, although of course improvements in technic, and therefore better results, were doubtless obtainable. Let us look back. What is left of the old surgery? Has not cerebral, gastric, hepatic, intestinal, pulmonary, and cardiac surgery been born and grown to lusty maturity since then? Are we assured against falling into error similar to that of Sir John Ericson? Certainly not; and it seems to me that the bulk of the profession is tending to perpetuate certain errors by keeping their eyes too exclusively fixed upon improvements in mere technic, which really determines much of our miscalled modern success. Our wonderful immunity against wound infection, and our control of many of the factors making for dangerous shock, seems to me to be leading us to perform numberless operations

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upon the plea that if not fatal from hemorrhage and shock—mostly preventable—operative recovery is sure to occur; as if satisfactory “end results” were not more important than temporary recovery—a somewhat doubtful blessing for the victims of malignant disease.

Do we not compile our statistics rather to demonstrate the success of our technic, so far as the immediate risk to life is concerned, rather than to show by the “end results,” *i.e.*, what benefit has accrued to the patient? Would it not be well to lay to heart some advice of Sir W. H. Bennett’s which I will quote. “It is well that we should beware lest a single predominant factor should be allowed to lead to our regarding, through a small tube only, a subject the horizon of which is absolutely unlimited. It has been said that the basis of surgery is handicraft, and this, in a sense, is true; but surely it is truth only half told,” for “lying behind certain issues” to which I have referred, “is a far greater thing—the knowledge of when to apply that craftsmanship of which everyone who now aspires to the practice of surgery should make himself a master. Nothing that has happened in the improvements connected with the practice of our art justifies, so far as I know, the modification by one iota of the edict of the great surgeon, who before advancing science had robbed operations of most of their horrors, said: “The all-important thing is not the skill with which you use the knife, but the judgment with which you discern whether its employment is necessary or not.” Substituting the word “technic” for “handicraft,” and “is worth while” for “is necessary,” this quotation epitomises the object of my address.

To appraise correctly the propriety of any operation we must not only ascertain the immediate mortality, but the *ultimate mortality*, from failure to really cure, before we subject our patients to useless risks. At least, we should be able to say that a certain number, however small, are cured, or that the interval before recurrence is likely to be long. No one recognizes more readily than I do how unreliable statistics are; but if with monotonous regularity the “end

result" is failure, at least we can be assured that this is vastly more likely to attend our future efforts than success, without any nice calculation of percentages,—and we shall cease to be self deceivers and blind leaders of our blinder but confiding patients.

In all business it is necessary to take stock from time to time, in order to ascertain whether our increasing income is a genuine return upon our invested capital, or whether we may not have impaired this and are gradually becoming bankrupt. So also in our profession it is wise to "take stock," as it were, to determine whether we really have made all the progress we claim, or whether, perchance, we have not diminished our capital of apparently well-grounded confidence, until the inevitable crash comes, revealing the true state of affairs, with its subsequent long-continued distrust of even conservative and genuine progress. This is well illustrated by the diametrically opposite advice given for the operative treatment of head injuries, during the eighteenth and nineteenth centuries. Should we find that real progress has been made, we can continue our practices; if partial advance alone has been secured, we must strive to render our success more complete; if real failure be the verdict of careful study, we must at once abandon that which has proved a broken reed, and start afresh in some new direction. Monumental conceit can alone oppose such periodic investigations, but those are unlikely to be welcomed with open arms who suggest the possibility that all which we now advocate and practice may not be good.

Following the example of one of my illustrious predecessors in this Presidential Chair, the late D. Hayes Agnew, instead of attempting to address you on some general subject, I shall strive to add my small contribution to the sum of more exact surgical knowledge. I have selected for investigation, total excision of the scapula for primary malignant disease. This of course practically means some form of sarcoma, since true carcinoma cannot be primary in bone. I am influenced in my choice because this is strictly a conservative opera-

tion for malignant disease of the bone, and because the local extirpation of all the neoplasm presents apparently most favorable conditions. Moreover, while not frequently performed, a sufficient number of cases are at everyone's disposal to guide us in deciding the following questions:

What are the probabilities as to operative death? Is there a material improvement in the numbers of the immediate survivals of the operations owing to our modern means for conserving blood? What are the chances for local recurrence, and are they early or late? Are early visceral metastases or recidives common? When operative recovery ensues, to what is the later death usually due? Is life much prolonged, and how much relief is effected by the operation? Can excision of the scapula be considered a curative operation, and if so, can this frequently be affirmed?

I shall endeavor to briefly settle for you these questions by the results of a study of all the recorded cases accessible to me in medical literature, and all unpublished cases with which the Fellows, and others have kindly supplied me by correspondence. A complete table of all unquestioned cases is appended, to enable the Fellows to review my conclusions if they so desire, and I must beg that they will judge of their correctness by glancing at the Tables (pages 8 to 17) as I read, these really constituting the body of my address.

I do not deny the possibility—indeed, the probability—that I have not secured reports of all total excisions of the scapula for malignant disease, and possibly more favorable results might thus be revealed if additional cases were unearthed, but after the exhaustive efforts I have made, I am convinced that no material change would be made in my conclusions.

A few words are requisite to explain the methods employed in the compilation of these tables, which differ widely from all their predecessors. Nothing so strongly impresses the conscientious student as the extraordinary inaccuracy of the tables purporting to be those of complete extirpations of the scapula. Many cases were really partial removals, or, sometimes, indeed complete removals, but done in two stages,

this latter method being a decidedly less dangerous operative procedure than complete removal at one sitting, although favoring local recidives and visceral metastases. Still further, cases are often admitted where portions of the clavicle or even the head of the humerus have been involved by the neoplasm and required removal; it is manifestly improper to include such cases in statistics purporting to be operations for disease restricted to the scapula, and is misleading as to the results of removal of the scapula alone.

A few cases have been included in my statistics where portions of the healthy clavicle, or even the head of the humerus have been removed. Such sacrifice of healthy bone tissue was to shorten the operation, to enable inadequate soft tissue flaps to cover the bones, or to mould the shoulder into better shape, not because of any trouble in the bones. Per contra in two instances in my tables small portions of the tip of the coracoid were left to facilitate operation, but in neither instance did these serve as the starting points for recidives, so far as is known (see cases of Gerster, No. 50, and of Bastiennelli, No. 59). It has seemed better to include these cases in the body of my statistics rather than to place them in the doubtful class, upon purely technical grounds.

In such cases it was thought that any increased risk of pyogenic or neoplastic infection of the cut osseous surfaces, or additional oozing, was more than counterbalanced by the greater certainty that no macroscopic diseased tissue was overlooked, and that the rapidity of the operation secured by cutting through, instead of disarticulating the clavicle or dissecting out the coracoid process, lessened both hemorrhage and shock. All such cases promptly recovered, thus showing that no additional operative risk was incurred.

Again, the most careful search throughout the whole domain of medical literature by myself and others, has failed to reveal any reliable information concerning certain cases found in nearly all tables. Their existence is not denied, only the propriety of quoting them is severely questioned. Even a case, which research showed was a removal of the scapula

after death, has been included by Karl Heldrich in his dissertation entitled, "Totale Resection der Scapula," München, 1903.

I can only attribute these blunders to the childlike confidence reposed by some in the accuracy of the headings of articles, inducing them to confine their researches solely to a perusal of the titles of reported cases, when a most cursory glance over the text would have shown the misleading character of these. In some few, the evidence advanced to prove that the disease was primary in, and confined to, the scapula has proved fallacious, a careful scrutiny of the history demonstrating that the neoplasm originated in contiguous muscles, this form of sarcoma being claimed by Butlin to be especially virulent as compared with bone sarcoma; these cases have been excluded or placed in the doubtful class. Contrary to the common practice, all cases where the microscopic picture and the subsequent clinical course proved that the growth was a pure enchondroma have been rigidly excluded from my tables. With still greater propriety, excisions for tubercular or pyogenic osteomyelitis and its consequences, are omitted, because in such cases if operative convalescence is secured, cure is effected, which certainly cannot be affirmed after operations for malignant disease. The inadequacy of the description of the microscopic appearances of one case of cyst of the bone following trauma, where no proper evidence of malignancy was supplied, led me to place this case in the "doubtful class."

Finally, from the later published reports, or by correspondence, some cases have been transferred from the cured class to the death column. From such researches I think that I am amply warranted in placing the question mark after cases which have made operative recoveries, but whose subsequent histories have extended only over a few months, and in some instances only a few weeks. The demonstrated inadequacy of the three years rule has led to its total disregard in this address, because a slavish and ignorant adherence to this artificial rule has led to many unwarranted statements upon which

has been founded erroneous practice. Under this rule recovery has been claimed while the reporter states that a late metastasis proved incapable of being radically treated.

All the statistics of the past, French, German, American, are absolutely misleading as to the operative mortality and end results of total excision of the scapula for primary sarcoma.

Although I have added twenty-two cases to those published in 1900 in Buchanan's tables, after a careful study of the literature by myself and two competent linguists, I have felt compelled to eliminate a number of cases, so that the total is slightly below that reported by Buchanan, for total extirpations, and upon which surgeons have relied since its publication in 1900. I wish here to acknowledge my indebtedness to this author both for his valuable tables and the information supplied me by his personal communications. I have also added two new cases to the second table comprising those where more than the scapula was involved in the malignant process.

A study of the 65 cases of malignant diseases tabulated, where the scapula alone seemed involved, has led to the surprising discovery that only one case is nearly certainly cured—MacDonald's, No. 39. Buchanan's case, No. 33, with hopeless metastases five years after excision of the scapula, should serve as a warning not to be over-sanguine. The following were probably cures, although in none had they been observed as long as Buchanan's. Case No. 4 of Syme's was well "several years" after the operation on the scapula, although this had been preceded by removal of the humeral head for a supposedly benign condition, and its admission to my list is perhaps of doubtful propriety.

Case No. 29 (Phelps) was believed to be well four years after amputation of the arm for recurrence. Cases 16, 38, 39, 46, 54, 60 and 61, were only followed for under four years. Accordingly we have one practically certain cure, and six probably cured, but one of these required a secondary operation and all may have relapsed later. Set against these

TABLE I.—END RESULTS AFTER TOTAL

No.	Operator	Date of operation	Sex Age	Condition for which operation was done	Operative results
1	J. Syme, Edinburgh..... Buchanan's list, No. 2	Oct. 1, 1856	F. 70 yrs.	Cystosarcoma	Recovery
2	F. von Esmarch, Kiel..... Buchanan's list, No. 6	May 9, 1859	M. 33 yrs.	Sarcoma	Recovery
3	A. Hammer, St. Louis..... Buchanan's list, No. 7	Oct., 1860	F. 18 yrs.	"Malignant growth" (Sarcoma)	Recovery
4	J. Syme, Edinburgh..... Buchanan's list, No. 8	Nov. 13, 1862	M. 45 yrs.	"Malignant growth" (Sarcoma)	Recovery
5	M. Michaux, Louvain..... Buchanan's list, No. 9	Nov. 24, 1864	M. 15 yrs.	"Encephaloma" (Sarcoma)	Recovery
6	S. Rogers, New York..... Buchanan's list, No. 11	Dec. 12, 1867	F. 7 yrs.	Carcinoma (Sarcoma)	Recovery
7	G. Pollock, London..... Buchanan's list, No. 13	Sept. 30, 1869	M. 47 yrs.	"Vascular growth" (Sarcoma)	Death
8	C. Steele, Bristol..... Buchanan's list, No. 14	April 18, 1871	F. 8 yrs.	Encephaloid (Sarcoma)	Recovery
9	K. King, Hull..... Buchanan's list, No. 15	June 17, 1871	F. 8 yrs.	Carcinoma (Sarcoma)	Recovery
10	J. Spence, Edinburgh..... Buchanan's list, No. 17	Feb. 21, 1872	M. 66 yrs.	"Malignant growth" (Sarcoma)	Recovery
11	R. Schnieder, Königsburg..... Buchanan's list, No. 19	Dec. 3, 1873	M. 6 yrs.	Sarcoma	Recovery
12	Wm. MacCormac, London Buchanan's list, No. 21	May 10, 1876	F. 29 yrs.	"Myxochondroma" Myxochondro- sarcoma (?)	Recovery

EXCISION OF THE SCAPULA FOR SARCOMA

Later history	End results	Remarks	Reference
No recurrence during two months, patient survived	Died in 2 m.	Exhaustion and old age, yet no adequate cause for exhaustion is given. Were there metastases in the organs essential to life?	Medico-Chirurgical Trans., London, 1857, vol. xl, p. 507.
Recurrence early	Died in 6 m.	Part of clavicle removed—apparently healthy—to facilitate operation	Archiv f. klin. Chirurg., 1863, vol. iv, p. 584
Recurrence early	Died 10 m. after operation	Three-fourths of inch of clavicle removed to facilitate operation	St. Louis Med. Rep., 1866, vol. i, p. 7.
No recurrence "several years later"	Recovery	Head of humerus had been previously removed for chondroma(?) It is somewhat questionable whether this case should be classed as an excision of the scapula in view of the previous operation	Syme, Excision of the Scapula, Edinburgh, 1864.
Rapid development of mediastinal growth	Death in 10 m.	.....	Gaz. Méd. de Paris, 1866, p. 313.
Rapid recurrence	Death in 6 m.	Carcinoma not being primary in bone, the growth must have been sarcoma	Amer. Journal Med. Sciences, 1868, vol. lvi, p. 359
Bronchopneumonia aggravated by the chloroform	Died on 5th d.	Part of clavicle removed because thought to be "slightly eroded." Were not the apparent bronchitic symptoms probably due to undetected pulmonary metastases giving rise to active symptoms from the irritant effects of chloroform?	St. George's Hospital Reports, 1869, vol. iv, p. 233.
Recurrence in less than seven weeks; this was removed but was followed by another in two weeks, which proved inoperable	Died middle of Sept. 1871, about 5 m.	Secondary operation at 7 weeks followed by hopeless recurrence	Brit. Med. Journal, 1871, vol. ii, p. 430.
No recurrence 2 years later	Recovery(?)	Too early for definite results, as many cases die from recurrence or metastasis much later	Liverpool and Manchester Méd. and Surgical Reports, 1874.
(?)	Died in 6 m.	Careful scrutiny of the history shows that bronchitic(?) symptoms existed before operation, continued with varying intensity during so-called "convalescence," culminating in death from "capillary bronchitis;" no post-mortem. The whole pulmonary condition was almost certainly due to lung metastases preceding operation	Dublin Journal of the Medical Sciences, 1873, vol. lv, p. 508.
Generalization	Died in 4½ m.	Uninvolved portion of clavicle removed to facilitate operation	Berlin. klin. Wochensch., 187, vol. xi, p. 377
Recurrence	Died Nov. 12, 1876, 6 m. after operation	Clavicle divided just internal to coracoid process for convenience. So-called myxochondromata contain genuine sarcomatous tissue if all portions of the growth are carefully examined in almost every instance	St. Thomas's Hospital Reports, 1876, vol. vii, p. 307.

TABLE I.—END RESULTS AFTER TOTAL EXCISION

No.	Operator	Date of operation	Sex Age	Condition for which operation was done	Operative results
13	J. Spence, Edinburgh..... Buchanan's list, No. 25	1877	.. . . .	"Tumor"	Death
14	G. A. Peters..... Buchanan's list, No. 26	Jan. 11, 1878	M. 42 yrs.	Carcinoma (Sarcoma)	Recovery
15	F. A. Nixon..... Buchanan's list, No. 28	Nov., 1881	M. 13 yrs.	Sarcoma	Recovery
16	A. Roth, Cagliari..... Buchanan's list, No. 29	Jan. 14, 1884	M. 33 yrs.	Myxosarcoma	Recovery
17	Geo. W. Gay, Boston..... de Nancrede	Feb. 1, 1884	M. 23 yrs.	Sarcoma	Recovery
18	Mr. Ellison..... Buchanan's list, No. 30	July 7, 1884	M. 13 yrs.	Sarcoma	Recovery
19	Lannelongue..... Buchanan's list, No. 33	Mar. 5, 1885	M. 34 yrs.	Chondrosarcoma	Death
20	J. H. Brinton..... Buchanan's list, No. 34	Oct. 3, 1885	F. 11 yrs.	Sarcoma	Death
21	H. Trendelenburg, Bonn..... Buchanan's list, No. 37	Nov. 16, 1886	M. 42 yrs.	Sarcoma	Recovery
22	T. F. Chavasse, Birmingham.... Buchanan's list, No. 41	Feb., 1888	F. 8 yrs.	Sarcoma	Death
23	P. Sandler, Magdeburg..... Buchanan's list, No. 43	May 2, 1888	F. 23 yrs.	Sarcoma	Recovery
24	J. Van der Hoeven, Jr..... Buchanan's list, No. 44	Mar. 7, 1889	M. 4½ yrs.	Sarcoma	Recovery
25	M. Perier..... Buchanan's list, No. 45	Oct. 14, 1889	M. 55 yrs.	Sarcoma	Recovery
26	Putti..... Buchanan's list, No. 46	1889	M. 45 yrs.	Sarcoma	Recovery
27	J. Israel, Berlin..... de Nancrede	July 6, 1890	M. 38 yrs.	Sarcoma	Recovery
28	Hadra, Erlangen..... Buchanan's list, No. 48	Jan. 13, 1891	M. 59 yrs.	Sarcoma	Recovery
29	A. M. Phelps, New York..... Buchanan's list, No. 49	Nov., 1891	M. 42 yrs.	Fibroma by pathologists. Because of recurrence, growth was evidently fibrosarcoma	Recovery
30	Putti..... Buchanan's list, No. 50	1891	.....	Sarcoma	Recovery
31	W. H. A. Jacobson, London..... Buchanan's list, No. 51	March, 1892	F. Adult	Sarcoma	Recovery
32	M. Folet of Lille..... Buchanan's list, No. 53	April 14, 1893	F. 19 yrs.	Sarcoma	Recovery

OF THE SCAPULA FOR SARCOMA—*Continued*

Later history	End results	Remarks	Reference
.....	Died	Clavicle divided near acromial end to facilitate operation. Nothing beyond statement that operation was done and result	Lectures on Surgery, 3rd Ed., vol. ii, p. 1107.
No recurrence at last report at the end of 3 months	Recovery(?)	Too early for definite end results	Amer. Journal of Med. Sciences, 1878, vol. lxxvi, p. 100.
Last record only few weeks after operation	Recovery(?)	Too early for definite end results	Brit. Med. Journal, 1881, vol. ii, p. 1056.
No recurrence in 1888, according to Tito Costa in Buchanan's table	Recovery(?)	Reasonably certain recovery, although may have recurred later	Melis, Extirp. della Scapola, Cagliari, 1886; Arch. di Ortop. Anno 10, No. 2, 1893. Buchanan's letter to author
Recurrence and death inside of the year	Death in less than a year	.....	Personal letter to de Nancrède.
No record after report in journal	Recovery(?)	.....	Austral. Med. Gaz., 1884, vol. iv, p. 39.
.....	Died in 36 h. Shock	Alcoholic subject	Leçons clinique Chir., Paris, 1885, p. 235.
.....	Died 1 h. from shock	.....	Maryland Med. Journ., 1885-6, vol. xiv, p. 21.
Recurrences Feb. 8, 12, 26	Died in 18 m.	.....	Trottmann, Ueber die Extirp. der Scapula, 1887
.....	Died same day	.....	Lancet, London, 1892, vol. ii, p. 471.
Sarcomatosis of lung, local recurrence	Death on 14th day	.....	Arch. f. klin. Chirurg., 1889, vol. xxxviii, p. 300.
No recurrence at the end of 15 months	R(?)	Too early to determine end results	Nederl. Tydschr., v. Geneesk, 1890, vol. xxvi, p. 521.
Last report Feb. 4, 1890	R(?)	Too early to determine end results	Le Mercredi méd., 1890, p. 51.
Lethal cause "Enterocolitis"	Died in 14 m.	Too early to determine end results	Riforma med. Napoli, May 1, 1891.
Sarcomatosis of liver, right pleura, and probably left lung	Died in 1 y.	.....	Berlin. klin. Wochenschr. vol. xxxiii Nov., p. 987-8.
Recurrence 1 month, operated. Second recurrence, operation attempted, abandoned	Died in 10 w. Sepsis	Head of humerus removed because of paucity of soft part covering	Hausmann, Ueber die totale extirpat. des Schulterblattes, 1892, Erlangen.
Recurrence and removal of arm July 3, 1895(?)	R	Well February, 1900	Medical and Surgical Reporter, Phila., Sept. 9, 1893; Personal communication to Dr. Buchanan.
No further data after May, 1891	R(?)	.....	Riforma med. Napoli, May 1, 1891.
Well two years later when last seen	R(?)	Too early to determine end results	The Operations of Surgery, London, 1897, p. 151; also personal letter Dec. 4, 1908.
Reported during same year	R(?)	Too early to determine end results	Bull. méd. du Nord., 1893, vol. xxxii, p. 305

TABLE I.—END RESULTS AFTER TOTAL EXCISION

No.	Operator	Date of operation	Sex Age	Condition for which operation was done	Operative results
33	J. J. Buchanan, Pittsburgh..... Buchanan's list, No. 56	Mar. 15, 1894	M. 34 yrs.	Sarcoma	Recovery
34	Madelung, Strasburg..... Buchanan's list, No. 58	Mar. 5, 1895	F. 23 yrs.	Sarcoma	Recovery
35	A. B. Johnson, New York..... Buchanan's list, No. 59	Oct. 9, 1895	M. 45 yrs.	Sarcoma	Recovery
36	J. C. Warren, Boston..... Buchanan's list, No. 60	Dec. 28, 1895	M. 14 yrs.	Sarcoma	Recovery
37	R. F. Weir, New York..... de Nancrede	1895	M. Adult	Sarcoma	Recovery
38	J. C. MacDonald, San Francisco. Buchanan's list, No 61	Jan. 31, 1896	F. 25 yrs.	Sarcoma	Recovery
39	T. K. Dalziel, Glasgow..... Buchanan's list, No. 62	Feb, 1896	M. 36 yrs.	Sarcoma	Recovery
40	J. Israel, Berlin..... de Nancrede	April 6, 1896	M. 36 yrs.	Myxochondro- sarcoma	Recovery
41	F. J. Shepherd, Montreal..... de Nancrede	June 26, 1896	F. 33 yrs.	Myeloid sarcoma	Recovery
42	G. H. Eddington, Glasgow..... Buchanan's list, Ho. 64	Dec. 27, 1896	F. 8 yrs.	Sarcoma	Recovery
43	J. E. van Iterson, Leyden..... Buchanan's list, No. 65	Jan. 22, 1897	F. 30 yrs.	Sarcoma	Recovery
44	A. W. Mayo Robson, Leeds, now London..... Buchanan's list, No. 67	July 20, 1897	F. 20 yrs.	Sarcoma	Recovery
45	G. B. A. Moynihan, Leeds..... Buchanan's list, No. 68	Sept. 16, 1897	F. 23 yrs.	Sarcoma	Recovery
46	L. Piqué, Paris..... Buchanan's list, No. 69	Oct. 26, 1897	F. 25 yrs.	Sarcoma	Recovery
47	Wm. T. Bull..... de Nancrede	Nov., 1897	M. 52 yrs.	Fibrosarcoma	Death in a few hours from shock

OF THE SCAPULA FOR SARCOMA—*Continued*

Later history	End results	Remarks	Reference
A growth had been removed 4 months before scapula was excised	Died after 5 y.	Inoperable recurrence in upper jaw	Phila. Med. Journ., 1900, vol. vi, pp. 7-82.
Local recurrence Apr. 26; removed: local recurrence June 10; op. refused	Died in 5 m.	Disease in central end of humerus and outer portion of clavicle. Died Aug. 10, 1895	Deutsche Zeitschr. f. Chir. 1896, vol. xliii, p. 443.
Reported well at end of about 1897 by letter to author dated Dec. 5, 1908	R(?)	Too early to determine end results	New York Med. Journ., vol. lxiii, p. 389, also personal letter (1908) to author.
Operated twice during 1896 for recurrences	R(?)	Drowned over year after primary operation	Boston Med. and Surg. Journ., 1896, vol. cxxiv, p. 511. Personal letter to author, 1908.
Traced only about 2 months	R(?)	Too early to determine end results	Personal communication to author.
Well at last observation 5 years after operation	R	Permanent recovery probably certain	Occidental Med. Times, 1896, vol. x, p. 600. Also personal letter to author, Dec. 15, 1908
Well Feb. 1900 (4 yrs.) by personal letter to Dr. Buchanan	R	Permanent cure highest degree probable	Glasgow Med. Journ., 1897, vol. xlvii, p. 140
Resection of head of humerus had been done one year previously by Gruber of Charkow for enchondroma	R(?)	Too early to determine end results. Somewhat doubtful if this case should be included in this list	Berlin. klin. Wochenschr., vol. xxxiii, pp. 987-988.
Lung metastases recognized in October, 1898	Died July, 1899, a little over 3 y.	.....	Montreal Med. Journ., vol. xxv, 1896-97; personal letter to author giving final results, Dec. 9, 1908.
.....	Died in 17 m. Generalization	Generalized metastasis (see second reference)	Glasgow Med. Journ., 1897, vol. xlvi, p. 202. Brit. Med. Journ., 1901, vol. 1, pp. 954-5, April 20.
Sensory anæsthesia and deficient circulation led van Iterson to remove the arm about Jan. 29., 1897	R?	No evidence as to what end results were	Personal communication to Dr. Buchanan, who in reporting the case leads the reader to infer that there was an operative recovery.
Sarcoma of lung	Died Sept. 10, 1899, about 13 m.	.....	Personal communication to Dr. Buchanan.
Rapid recurrence at operative site in 22 days, when an operation was done	Died in 37 d.	.....	Brit. Med. Journal, 1898, vol. i, p. 1198.
In 1900 condition was reported as good	R(?)	External third of clavicle normal but removed to facilitate operation	Bullet. Soc. Anat. de Paris, vol. lxxii, 1897, p. 919. Piqué et Dartigues, Rev. de Chir., Paris, vol. xxi, pp. 437-488.
.....	Death	.....	Extract from records of New York Hospital secured by the kindness of Dr. F. W. Murray.

TABLE I.—END RESULTS AFTER TOTAL EXCISION

No.	Operator	Date of operation	Sex Age	Condition for which operation was done	Operative results
48	M. Schmidt, Cuxhaxen Buchanan's list, No. 70	Dec. 5, 1897	M. 57 yrs.	Sarcoma	Recovery
49	Dr. Tricomi, Rome de Nancrede	1899(?)	M. 47 yrs.	Myxochondrosarcoma	Recovery
50	A. Gerster, New York de Nancrede	July 11, 1899	M. 8 yrs.	Sarcoma	Recovery
51	C. H. Golding-Bird, London Buchanan's list, No. 72	Jan. 10, 1900	F. 10 yrs.	Sarcoma	Recovery
52	E. Quenu and G. Renon de Nancrede	July 23, 1902	M. 16 yrs.	Sarcoma	Recovery
53	Rotter, operated by Gunkel de Nancrede	1903	.....	Endothelioma (Sarcoma)	Recovery
54	C. M. Stemen, Kansas City de Nancrede	March, 1904	M.	Sarcoma	Recovery
55	A. Nota de Nancrede	Mar. 12, 1904	M. 46 yrs.	Sarcoma	Recovery
56	Chas. C. Allison, Omaha de Nancrede	.....	.....	Sarcoma	Recovery
57	G. W. Crile, Cleveland de Nancrede	.....	M. 12 yrs.	Sarcoma	Recovery
58	P. Bastienelli, San Giovanni Valdarno de Nancrede	Feb. 20, 1905	F. 9 yrs.	Sarcoma "Myelogenic osteosarcoma"	Recovery
59	F. J. Lutz, St. Louis de Nancrede	April, 1905	M. 31 yrs.	Sarcoma	Recovery
60	J. J. Buchanan, Pittsburg de Nancrede	July 1, 1905	F. 18 mos.	Sarcoma	Recovery
61	C. B. G. de Nancrede, Ann Arbor de Nancrede	Feb. 1, 1906	M. 28 yrs.	Sarcoma	Recovery
62	L. A. Dunn, London de Nancrede	Nov. 7, 1904	M. 35 yrs.	Sarcoma	Recovery
63	M. Lejars, Paris de Nancrede	July 9, 1908	F. 24 yrs.	Sarcoma	Recovery

OF THE SCAPULA FOR SARCOMA—*Continued*

Later history	End results	Remarks	Reference
Local recurrence at end of one year; a metastatic growth at exit of one sciatic nerve from pelvis	Probably (?) fatal. Last trace Jan. 13, 1899	Secondary growths in axilla were removed once	Deutsche Zeitschr. für Chir., 1898-99, vol. 1, p. 394.
Traced only one month after operation	R(?)	Too early to determine end results	Extirp. completa della Scapola per sarcoma. Arch. ed atti d. Soc. Ital. di Chir. 1899, Roma, 1900, vol. xiv, pp. 263-264.
No record beyond one month	R(?)	Too early to determine end results	Festschrift, Abraham Jacobi, May 6, 1900, p. 124.
No record beyond one month	R(?)	Entirely too early for any definite end results	Personal communication to Dr. Buchanan.
Record of barely 4½ months	R(?)	Too early for any definite end results	Rev. de Chirurg., Paris, vol. xxvii, pp. 421-436.
Several weeks later head of humerus removed to facilitate healing; died of "croupous pneumonia"	Died 4 m.	Was not the "croupous pneumonia" really pulmonary sarcomatosis, producing consolidation and a simulation of genuine pneumonia?	Deutsche Wochenschr. Vereins-Beilage, vol. xxix, p. 177.
None, but information inadequate	R(?)	Alive in 1908	Personal letter to author.
Last report 6 months after operation	R(?)	Too early for end results	Gior. d. R. Acad. di Med. di Torino, 4, S. vol. x, pp. 651-657.
Visceral metastasis in two years	Died soon after secondaries appeared	.....	Personal letter to author.
Early intrathoracic metastases	Died in 6 m.	.....	Personal letter to author.
Well on Dec. 15, 1908, as reported by operator to author by letter	R(?)	Tip of coracoid left to facilitate operation. Enlarged axillary gland removed nearly two years later. Was well Dec. 15, 1908	Sopra un caso di extirpas totale della scapola sinistra, Polyclinico, Roma, vol. xiv, sez. prat., pp. 97-102. Personal letter Dec. 15, 1908.
.....	R(?)	Reported well 32 months	Surgery, Gynecology and Obstet., Chicago, vol. iv, pp. 11-12. Personal letter Dec. 13, 1908.
Discharged within one week; later news, Jan. 22, 1909, well	R	Perfectly well Jan. 22, 1909	Personal letter to author. Jan. 15, 1909. Letter from father 1-22-1909. Kindly sent me by Dr. Buchanan.
Marked recurrence (inoperable) by Aug. 24, 1906; soon after "became numb from breast down, with secondaries probably in the dorsal vertebrae"	Died of recurrence and generalization, 4 mos. 19 days	Died July 19, 1906	Hospital Record, University of Michigan.
Reported well nearly two years after operation. In 1907(?) extensive local recurrence and death	Death in about 3 y.	.....	Brit. Med. Journ., March 26, 1908. Personal letter of Jan. 9, 1909 to author.
Latest report, 3 months	R(?)	Clavicle divided for convenience. Too early for determination of end results	Sarcome de l'omoplate gauche, ablation totale de l'omoplate. Bull. et Mém. Soc. de Chir. de Paris, N. S., vol. xxxii, pp. 802-4.

TABLE I.—END RESULTS AFTER TOTAL EXCISION

No.	Operator	Date of Operation	Sex Age	Condition for which operation was done	Operative results
64	S. McEwen, Orlando, Florida.... de Nancrede	Jan. 25, 1908	M. 26 yrs.	Endothelioma (Sarcoma)	Recovery
65	F. N. Pryanishnikov..... de Nancrede	1908	M. 7 yrs.	Sarcoma	Recovery

TABLE II.—CASES WHERE MORE THAN THE SCAPULA WAS INVOLVED BEING REMOVED AT ONE SITTING WITH PRESERVATION

No.	Operator	Date of Operation	Sex Age	Condition for which operation was done	Operative recovery
1	Von Langenbeck, Berlin..... Buchanan's list, Case 1	May 22, 1855	M. 12 yrs.	"Malignant growth" (Sarcoma?)	Recovery
2	M. Michel, Strasburg..... Buchanan's list, Case 12	Sept. 20, 1868	M. 50 yrs.	Cyst of bone, almost certainly benign	Recovery
3	J. Spence, Edinburgh..... de Nancrede	Dec. 25, 1871	M. 68 yrs.	Tumor	None
4	G. Poincot, Bordeaux..... Buchanan's list, No. 31	Sept. 6, 1884	M. 52 yrs.	Sarcoma	Death
5	A. MacCormac, Sidney..... Buchanan's list, No. 38	April, 1887	M. 56 yrs.	Sarcoma, primary in muscle	Recovery
6	C. H. Golding-Bird, London..... Buchanan's list, No. 52	Mar. 28, 1893	F. 14 yrs.	Sarcoma	.....
7	P. Berger, Paris..... Buchanan's list, No. 66	June 2, 1897	F. 21 yrs.	Sarcoma	Recovery
8	C. M. Stemen, Kansas City..... de Nancrede	Nov. 14, 1899	M. 51 yrs.	Sarcoma	Recovery
9	M. Poisson..... de Nancrede	1905	M. 30 yrs.	Sarcoma	Recovery

* I desire to express my indebtedness to Dr. C. A. Pfender, of Washington, D. C., and to Dr. M. Kollig, of Ann Arbor, Mich.

OF THE SCAPULA FOR SARCOMA—*Continued*

Later history	End results	Remarks	Reference
Last accessible report less than seven months after operation	R(?)	Too early to determine end results	Journal of the Amer. Med. Association, vol. ii, Aug. 29, p. 757.
Inoperable metastases in less than 2 months on head	Died. Exact time not given	Resection of the head of the humerus and portion of the clavicle "for the purpose of securing a better joint," but they were apparently uninvolved by the neoplasm	Khirurgia, Mosk., vol. xxiii, pp. 141-148.

IN THE NEOPLASM, ALL OF THE SUPPOSEDLY DISEASED TISSUES OF THE REMAINDER OF THE UPPER EXTREMITY.

Later history	End results	Remarks	Reference
Recurrence in 109 days	Died in 3½ m.	Three inches of clavicle removed because imbedded and involved in the growth	Fock, Deutsche Klinik, 1855, No. 38, p. 422.
No recurrence	Recovery lasting over 5 y.	Microscopic description indicates probably a relatively benign myeloid growth	Levrey, Resection complète du Scapulum, 1869; also Case 3 of Heldrich, Totale Resectionen der Scapula, Diss. 52 p., Muenchen; Also Gaz. Hebdom. de méd., Paris, vol. ii, pp. 432-435.
Rec.?	.....	Clavicle divided for convenience. Clinical diagnosis; malignant. Course pursued and microscopic appearances left Mr. Spence in doubt.	Lect. on Surg., 3d ed., vol. i, p. 963 et seq.
No time for recurrence	Died in 2 d.	Outer portion of clavicle involved and removed; head of humerus excised for better shaped shoulder. "Gangrene gazeuse"	Rev. de Chir., Paris, 1885, vol. v., p. 201.
Operation for recidives June and December 1889; patient well 1898	R	Acromium sawn across at base and left. Growth primary in serratus magnus muscle, later involving scapula, the recidives, required removal of portions of the external intercostals; cautery freely employed	Australasian Med. Gaz., 1898, vol. xvii, p. 295.
Recurrence in wound and axilla	Died in 1 y. 5 d.	A part of the clavicle was involved in the disease and removed	Lancet, London, 1893, vol. i, p. 1066; also personal communication to Dr. Buchanan.
Recurrence of growth excised early in 1899	R(?)	Latest report March 1900; too early for definite end results. Primary growth was in the trapezius, secondary in the scapula and clavicle, a portion of the latter being removed	Bull. et Mém. Soc. Chir. de Paris, 1897, vol. xxiii, p. 571. Later personal letter to Buchanan.
Removal of one half of clavicle because involved by the neoplasm	Died 19 hours after operation	.....	Personal letter to author.
No definite after history	R(?)	Curettage of a neoplastic area in the head of the humerus	Ablation totale d'omoplate. Gaz. Méd. de Nantes, 2. S. vol. xxiii, pp. 114-115.

successes (?) the cases of the following patients whose records are complete, who died from the operation or its results, or from either recidives or metastases, or where the data were too incomplete to determine the "end results."

Case number.	Results.
1.	Died in two months.
2.	Died in six months.
3.	Died in ten months.
4.	Apparent recovery, already referred to.
5.	Died in ten months.
6.	Died in six months.
7.	Died on fifth day.
8.	Died in five months.
9.	No data after two years.
10.	Died in six months.
11.	Died in four and one-half months.
12.	Died in six months.
13.	Died, no date.
14.	Observed three months.
15.	Observed few weeks.
16.	Probable cure.
17.	Died under one year.
18.	Died in a few months.
19.	Died in thirty-six hours.
20.	Died in one hour.
21.	Died in eighteen months.
22.	Died on same day.
23.	Died on fourteenth day.
24.	Died in fifteen months.
25.	Died in three and one-half months.
26.	Died in fourteen months.
27.	Died in one year.
28.	Died in ten weeks.
29.	(Phelps) probably cured.
30.	Observed only a few months.
31.	Observed only two years.
32.	Died under one year.
33.	Died in over five years.
34.	Died in five months.
35.	Observed only about two years.
36.	Drowned about four years after last operation.
37.	Traced only about two months.
38.	Died from recurrence after sixth year.
39.	Probable cure.
40.	Only a few months.
41.	Died in three years.
42.	Died in seventeen months.

Case number.	Results.
43.	No later history.
44.	Died in thirteen months.
45.	Died in thirty-seven days.
46.	Probable cure but too early for reliable results.
47.	Died in probably two years.
48.	Only traced one month.
49.	Only traced one month.
50.	No record beyond one month.
51.	Record only four and one-half months.
52.	Died in about four months.
53.	Possible cure.
54.	Record only six months.
55.	Died in over two years.
56.	Died in six months.
57.	Nearly three years, possible cure.
58.	Observed thirty-two months.
59.	Observed over three and one-half years.
60.	Observed three years and seven months, then well.
61.	Died in five months.
62.	Died in three years.
63.	Observed only three months.
64.	Observed less than seven months.
65.	Died from early inoperable cranial growths within less than two months.

Cases 48, 49, 50, 51, 53, 57, 58, 63, 18 and 63 have no reliable record as to "end results," having data lasting perhaps only one week, one month, four and a half, six months, up to and at most thirty-two months in one case. In the light of the evidence of recurrence, as shown by the records of other cases already quoted, who can doubt that the "end results" if known, would be as bad as those already finally determined, *i.e.*, usually death, possibly one or two recoveries.

Putting the facts in another way, out of 65 cases, 26 were dead in less than one year, 3 were dead inside of eighteen months, 2 survived two years, 2 lived for three years and 1 for five years before succumbing. Thirty-five then died inside of two years—over one-half.

Of the 9 cases included in my second table where disease had invaded the surrounding tissues requiring their removal, and including two cases where the diagnosis was doubtful, the showing is not materially better.

Case No. 1 died in three and one-half months; Case No. 2 was well over five years but the malignancy of the growth is much in doubt; No. 4 died in two days from wound infection; No. 5 where the growth was secondary in the scapula was well nine years later after repeated operations; No. 6 died in one year and five days; No. 7 was only observed about one year; No. 8 died in nineteen hours; while concerning Nos. 3 and 9 there is no definite history.

To what conclusions does this sorry showing drive us? That except under peculiarly advantageous conditions, we cannot hope for much prolongation of life, and still more rarely for a permanent cure. This latter can only be secured by a very early operation—almost as soon as the growth is diagnosed. Unfortunately, in certain instances, even the earliest possible intervention will prove unavailing, probably owing to the unusually favorable relations of the minute blood-vessels of the growth to the neoplastic cells, presenting facilities for their embolic dissemination.

The probabilities as to operative death; whether recoveries are more common than in the past; the probabilities of local or general recurrence; whether these are early or late; to what late death is due when operative recovery occurs; and can excision of the scapula be considered a curative operation, are best and most fully answered by a study of my tables,—nevertheless, I shall dwell chiefly upon some of these points. One question as to whether life is prolonged when death results from recidives or generalization cannot be answered, as there are no data securable as to the natural history of unoperated sarcomata of the scapula.

Study of the literature reveals other data than those which I can now give, showing how commonly recurrence in loco takes place, and how probable it is that the recidives provide the foci whence generalization occurs, the primary growth having been removed before metastases had taken place; hence, if local recurrence is preventable by earlier operation, a certain number of fatal cases of visceral involvement might be avoided. At once the question suggests itself, might not an

interscapulo-thoracic amputation instead of an excision of the scapula render possible a much wider extirpation of the tissues in which recidives occur, and thus lead to a greater number of permanent recoveries? The evidence on this point I have not attempted to secure but would urge that this investigation be made in the near future by some one of the Fellows.

The commonly accepted reasons for the early metastases by the vascular system are too well known to need mention, but I believe clinically, too much stress is unwittingly placed upon one fact and too little upon another, unconsciously creating a tendency to fall into a most serious error. Because lymph-node infection is a not uncommon possibility in sarcoma of bone, in the absence of any such complication, when no obvious visceral metastases are detectable, we too often ignore the probability of the presence of innumerable minute metastatic deposits in the lungs and other organs, which from their small size, their number and uniform dispersion throughout the viscera, defy detection by the most expert diagnostician *at the time of operation*, too often to demonstrate their fatal presence after all the primary focus has been thoroughly removed, and where no recidives appear in situ, whence the generalization could have occurred.

While my tables cannot be made to show in a definite way the propriety of these statements, the extended histories of many of these cases fully warrant my assertions.

Although these cases do not appear to bear upon the question of the lessened operative mortality of excision of the scapula, operative removal of the scapula for other conditions as well as the more recent cases included in my tables, show that total excision of the scapula is somewhat less dangerous than formerly. Possibly some patients who died in the past of shock and hemorrhage, had they survived would have shown additional cures, so that the probabilities of slightly improved "end results" may be anticipated. If this operation is performed for unquestionably benign growths, it is entirely proper and should prove increasingly successful. Percentages, as be-

fore stated, are misleading rather than informing, hence none such will be given.

Certainly metastases and recidives are common, if indeed metastases have not already occurred before operation, but have been overlooked.

With very few exceptions, all complete histories sooner or later show that death resulted from local recurrences or generalization throughout the economy.

Although I am unwilling to take an extreme position, if the positive diagnosis of malignant disease can be made, I shall, I think in the future, recommend early intercostohumeral amputation, until this procedure is also proved to be inferior, or no better, in the "end results" than complete excision of the scapula alone, and I shall set my face absolutely against any partial resections of the shoulder-blade for malignant disease.

No one can deny that retention of the remainder of the upper extremity is desirable, and that it is always of some utility, while in many the ability to use the arm is surprisingly good. Nevertheless, life should be considered first, utility last.

None would be more pleased than I to have my gloomy forecasts disproved, but I cannot shut my eyes to what I have learned from a study of the literature of the subject. The outcome of my investigations was a complete surprise to me, as I anticipated a far different result.

In conclusion, permit me to ask a careful consideration of my tables, prepared only after the consumption of a vast amount of time and study and which have led to such unforeseen conclusions. I would also insist upon the propriety of the application of similar methods to the study of some of our accepted plans of treating other diseases. This is not my first experience of the disillusionizing effects of a study of "end results." A number of years ago I read a paper in Chicago, where my own experience and that of others to which I had access, demonstrated *by the end results*, the almost certainty of ultimate failure to cure focal and Jacksonian epilepsies by the excision of the discharging cerebral lesions.