A pioneer of urologic surgery from a small town in Ontario, Canada: A tribute to Abraham Groves (1847-1935)

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Abstract

Background: Abraham Groves worked as a general practitioner and surgeon in the small town of Fergus, Ontario, Canada. Several priority claims have been attributed to Groves' life in surgery, including aseptic surgery (1874), appendectomy (1883) and the use of surgical gloves (1885). He was also an early practitioner of urological surgery.
Objective: The purpose of this paper is to describe and objectively assess his contributions as a pioneer in urological surgery.
Methods: A systematic search of contemporary journals was made for articles by or about Groves. These articles and his 1934 autobiography were reviewed. The information was assessed not only for priority, but also for the development of organized surgical principles and thought.
Results: Groves published frequently throughout his career; up to this point, 36 papers have been identified. Groves' claims are verifiable for aseptic surgery, which were the result of logical surgical thought and was practiced throughout his career. Contemporary publications support his early use of suprapubic lithotomy (1875), prostatotomy (1887), bladder repair (1892), urethral repair (1903), renal decapsulation (1905) and prostatectomy (1911).
Conclusions: Despite his isolation, Abraham Groves independently developed a full range of surgical techniques and principles relevant to modern-day urology. His impact was reduced by the nature of the environment in which he worked and by the limited circulation of the journals in which he chose to publish.

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Résumé

Contexte : Abraham Groves était omnipraticien et chirurgien dans la petite ville de Fergus, en Ontario. Plusieurs percées importantes lui ont été attribuées, comme la chirurgie en asepsie (1874), l'appendicectomie (1883) et l'emploi de gants chirurgicaux (1885). Il a aussi été un pionnier de la chirurgie urologique.
Objectif : Le présent article vise à décrire et évaluer de façon objective les contributions d'Abraham Groves dans l'évolution de la chirurgie urologique.
Méthodologie : Une recherche systématique des revues médicales de l'époque a permis de dégager des articles signés par Groves ou portant sur ses travaux. On a ensuite passé en revue ces articles et son autobiographie, datant de 1934. On cherchait dans ces documents non seulement des preuves de ses percées sur le plan scientifique mais aussi l'élaboration de principes et théories structurés en chirurgie.
Résultats : Groves a publié de nombreux articles; jusqu'à présent, nous en avons trouvé 36. Il a été possible de confirmer les découvertes de Groves concernant la chirurgie en asepsie, technique découlant de la logique scientifique et qu'il a pratiquée durant toute sa carrière. Des articles de l'époque confirment son utilisation de la lithotomie sus-pubienne (1875), de la prostatotomie (1887), de la réparation vésicale (1892), de la réparation urétrale (1903), de la décapsulation rénale (1905) et de la prostatectomie (1911).
Conclusions : En dépit de son isolement, Abraham Groves a élaboré de façon indépendante une gamme de techniques chirurgicales et de principes toujours pertinents en urologie de nos jours. Son influence a été limitée par la nature de son environnement professionnel et par la circulation limitée des périodiques dans lesquels il a choisi de publier.

Introduction

A brief historical overview of Groves' life can help to understand how this "backwood" doctor independently developed an organized surgical system with a resulting exceptional surgical career (Fig. 1). Abraham Groves was born on September 8, 1847 near Peterborough, Ontario, Canada, from Irish immigrant parents. In 1856, the Groves family moved to a 200-acre farm, 4 miles from Fergus, Ontario.[1,2] After he finished high school, he left home in 1867 to register in the Toronto School of Medicine.

During this time, medical education in Toronto was going through a difficult period. The practical bedside training was fragmented and inadequate. The Toronto General Hospital had to close in 1868 to 1869 due to lack of funds. Groves had less than 6 months of apprenticeship as an assistant to a Toronto doctor before beginning his practice in 1871 in his hometown of Fergus, Ontario. Thirteen classmates of Groves, including William Osler, graduated elsewhere to complete their clinical training.[1,2]

At the time, abdominal surgeries were associated with significant complications and mortality, and avoided by the academic surgeons. Groves recounted: "during my

undergraduate course there was not, so far as I know, one abdomen opened in the Toronto General Hospital."[3] This made his inauguration as a surgeon, after 3 years of general practice, even more extraordinary when he operated on a 40-year-old woman with cystic ovarian tumour filling the entire abdomen in 1874.[3,4]

During his 60 year career, he performed over 20 000 operations. His belief regarding preventive medicine, including abstinence from alcohol or tobacco, allowed him to maintain his own health until he died in 1935 from pneumonia at the age of 87.[1,2,5]

Several priority claims have been attributed to Groves, including aseptic surgery (1874),[4] appendectomy (1883)[3] and the use of surgical gloves (1885).[3] His contributions as a pioneer in urology are less well-known. In this paper, these priority claims will be presented and discussed in relation to the history of urologic surgery.

Methods

A systematic search of contemporary journals was made for articles by or about Abraham Groves. These articles, as well as his 1934 autobiography *All in the Day's Work,*[3] were reviewed. Overall, Groves published 36 medical papers

Table 1. Groves' medical publications

	Journal name	Article title	Date
1	Canada Lancet	Case of ovariotomy[4]	1874
2	Canada Lancet	Case of ovariotomy[24]	1875
3	Canada Lancet	A case of double ovariotomy[25]	1878
4	Canadian Journal of Medical Science	Supra-pubic lithotomy[11]	1881
5	Canadian Practitioner	Removal of firmly adherant solid tumour ovary[26]	1883
6	Northwest Lancet	Puerperal septicaemia[27]	1883
7	Canadian Practitioner	The operative treatment of fluid effusions of the chest[28]	1884
8	Canadian Medical and Surgical Journal	Empyema[29]	1884
9	Canada Lancet	Renal calculi[23]	1885
10	Canada Lancet	Prostatotomy[13]	1887
11	Canadian Practitioner	Prostatotomy[14]	1887
12	Canadian Medical and Surgical Journal	Prostatectomy[15]	1887
13	Canada Lancet	Vaginal hysterectomy with abdominal ovariotomy[30]	1889
14	Montreal Medical Journal	Peri-typhlitic abscess[31]	1890-1891
15	Canada Lancet	Immediate closure of the wound after supra-pubic cystotomy[12]	1892
16	Dominion Medical Monthly	Laparo-elytrotomy[32]	1893
17	Eclectic Medical Journal	Extrauterine pregnancy[33]	1895
18	Montreal Medical Journal	The local treatment of intrauterine sepsis[34]	1899
19	Canada Lancet	The action of x-rays in diseased structures[35]	1903
20	Canada Lancet	Estlanders operations - 3 cases[36]	1903
21	Canada Lancet	Diagnosis and treatment of tuberculous peritonitis[37]	1903
22	Dominion Medical Monthly	Operation for traumatic epilepsy[38]	1903
23	Dominion Medical Monthly	Appendiceal diseases[39]	1903
24	American Medicine	Operative treatment of the ruptured urethra[18]	1903
25	Dominion Medical Monthly	Intestine ruptures by kick of a horse[40]	1903
26	Canadian Practice and Review	The radical cure of hernia[41]	1904
27	Canadian Practitioner	Radical cure of hernia[42]	1904
28	Canada Lancet	Intra-abdominal anastomosis[43]	1904-1905
29	American Medicine	Intra-abdominal anastomosis[44]	1905
30	Canada Lancet	Case of acute uraemia in which decapsulation of the kidney was performed[19]	1905-1906
31	Canada Lancet	Thyroidectomy[45]	1907
32	Canada Lancet	Pyloroplasty[46]	1909
33	Canada Lancet	Prostatectomy[16]	1911-1912
34	CMAJ	Evolution of surgery[10]	1922
35	CMAJ	Rupture of the bladder[47]	1923
36	CMAJ	Fracture of the clavicle, acromium process and surgical neck of the scapula[48]	1924

Fig. 1. Portrait of Dr. Abraham Groves , circa 1920 (Wellington County Museum and Archives, ph 10150).

from 1874 and 1924 (Table 1). Articles were identified through the Index-Catalogue of the Library of the Surgeon-General's Office (US army, Series 1-5). Eleven scholarly and 3 newspaper articles (*Toronto Globe*, *Toronto Star* and *Fergus Record*) about Groves were published between 1948 and 2003. Additionally, material was found in 5 archives (Wellington County Museum, Ontario Medical Association, Archives of Ontario, Dittrick Museum in Cleveland and Toronto Academy/Toronto General Hospital). The information relevant to urologic surgery field was collected and assessed not only for priority claims, but also for the development of organized surgical principles and thought.

Results

Groves published frequently throughout his career; 36 papers have been found (Table 1). He spoke at regional meetings in Ontario, but not in the United States. He was a founding member of the Ontario Medical Association, but not of the American College of Surgeons.

Aseptic surgical technique

It is likely that the early adoption of aseptic techniques permitted him to succeed in urologic surgery. Prior to his first major operation in May 1874,[4] Groves was advised by colleagues to avoid the procedure. At that time, he knew that typhoid fever could result from drinking water that appeared pure. Groves reasoned that since typhoid was carried by water, infections after surgery might arise from infected fluids of the patient, the surgeon's hands, the instruments or the sponges. To minimize infection, he decided to boil the water used during operations and allowed it to cool. In this way, all his instruments and sponges were boiled. Carbolized catgut was also used to tie vascular pedicles and cotton saturated with a solution of carbolic acid was used to dress the wounds.[2-4]

Fig. 2. The *Bullfrog Tavern* (Guelph, Ontario) where Groves proceeded to his first suprapubic lithotomy (taken from *All in the Day's Work*). The tavern still exists today as a barber shop.

It is not precisely known when the first description of aseptic surgery was documented. Lister, perceiving that Pasteur's heat sterilization had no relevance to surgical procedures, turned to chemical antisepsis with carbolic acid by 1867. Koch and his assistants perfected the idea of steam sterilization in 1881.[6] However, heat sterilization was not truly introduced into surgery until Von Bergmann described it in 1886, 12 years after Groves' description.[7] It was not until 1888 that Davidsohn consistently taught surgeons in the United States to boil their instruments.[8]

Suprapubic lithotomy

Bladder stones had been treated through perineal extraction for centuries. While the suprapubic approach was documented for the first time by Pierre Franco in 1556 and subsequently by John Douglas among others; this approach, however, was not generally approved for stone extraction and was virtually unknown among contemporary surgeons.[9] For his first stone extraction, Groves proceeded through a suprapubic route. His description of 4 cases was a first in Canada.[3,10]

His first suprapubic cystolithotomy involved a 63-year-old man weighing over 300 pounds. Surgeons of the highest standing had refused to operate on him, believing that the perineal route would not provide access to the bladder. Groves, however, performed the suprapubic cystolithotomy on April 20, 1878, in a room of an old hotel, the Old Bullfrog tavern in Guelph, Ontario (Fig. 2). Assisted by 2 medical students, he removed 6 calculi (Fig. 3). After this groundbreaking procedure, the patient promptly recovered without complication.[11]

Fig. 3. The 6 bladder calculi removed by the suprapubic route, in 1878 (taken from *All in the Day's Work*).

In cases involving bladder stones, the bladder was usually in an unhealthy condition, containing "ropy mucus, pus, cast-off epithelium, decomposing blood clots or fetid urine." However, Groves realized that "... immediate union [of the wound] is the ideal result we are striving for…on account of the constant escape of urine through an open wound..."[3]

In 1892, Groves described his technique of immediate wound closure after suprapubic cystotomy.[12] First, to obtain a cleaner surgical field, Groves performed antiseptic cleansing of the bladder. Using Thiersch's solution of salycilic and boracic acids, the bladder was irrigated with copious and repeatedly washed for a number of days. Finally, the whole wound was flushed with bichloride solution and the bladder was closed with continuous catgut suture. To prevent rupture of the ill-conditioned bladder, drainage was provided through a catheterization system similar to contemporary catheter management.

Prostatotomy

In 2 publications,[13,14] Groves demonstrated an advanced knowledge of anatomy and the physiopathology of prostate enlargement. Despite the fact that the prostatotomy procedure is currently performed endoscopically (transurethral incision of prostate), the principles behind his approach reflect current therapy.

Prostatotomy was performed early in Groves' practice. The patient was placed in the lithotomy position, and a grooved staff passed into the bladder. The skin incision was made in the median perineal line, and the membranous portion of the urethra opened as close to the prostate as possible. Then an ordinary lithotomy knife was passed along the grooved staff and the obstructing portion of the prostate incised (Fig. 4). A drain was inserted and the staff was withdrawn; the patient recovered with prolonged bedrest to prevent dislodgement of the drain.[13,14]

Prostatectomy

Through his experience with suprapubic lithotomy, Groves progressively mastered the suprapubic approach for urologic disease.[15] A publication from 1911 reported his experience

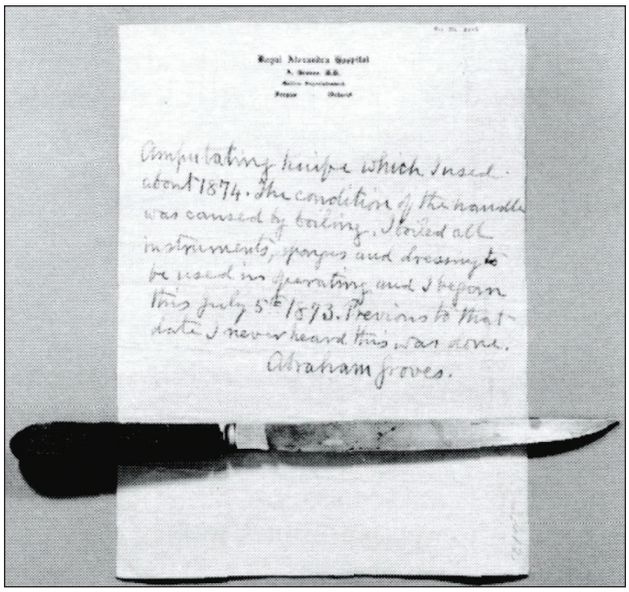

Fig. 4. Groves' amputation knife. Quoting Groves: ' ... the handle split and loosened. This was caused by my boiling every instrument and all things used in an operation (taken from the *Dittrick Museum of Medical History of the Cleveland Medical Library Association*).

with transvesical prostatectomy.[16] There are sources that indicate that Groves performed the first prostatectomy in 1887,[15] the same year it was reported by McGill in Leeds, UK and 4 years prior to Goodfellow who described perineal prostatectomy.[17] To the best of our knowledge, there are no documents that describe Groves' surgical technique and no documentation of the location and exact time of the first procedure. According to modern texts, neither McGill, Goodfellow nor Groves were granted credit for the first prostatectomy. This distinction was given to Fuller in 1894 and popularized by Freyer in 1900. It was not until 1947 that the contemporary open approach was described in detail by Millin.

In Groves' publication on prostatectomy, he described the surgical principles behind prostatectomy, but did not document anatomical or surgical details about the prostatectomy procedure. He stated merely that he preferred the suprapubic over the perineal approach, due to improved exposure to the prostate through the suprapubic approach. He stated that "since the prostate enlarged towards the bladder and not towards the perineum," the suprapubic approach could facilitate the removal of the adenoma.[3] He reported a remarkably low mortality rate for the time: only 3 of 100 patients died from pneumonia, prostate cancer and sepsis.

Urethral repair

In a short article published in *American Medicine* in 1903,[18] Groves described the operative treatment of a ruptured urethra. Again, his description adopted principles employed

by modern-day urologists. He indicated that extravasation of blood and urine in the bruised and torn tissues rendered reconstruction of the urethra after pelvic trauma a daunting task. In managing urethral injury, he described a combined suprapubic and perineal approach. This involved antegrade passage of a catheter from the open bladder along the urethra to localize the proximal urethra. He also commented on the resulting problem associated with delayed surgical repair: "if the edges are not approximated, cicatricial tissue will results and a troublesome stricture develop."[3] He also found success with delayed reconstruction of the urethra.

Renal decapsulation

In 1903, Groves published a case of decapsulation of kidneys performed in a patient with acute nephritis.[3,19] Despite the fact that this procedure is not currently in vogue, renal decapsulation later developed interest and its merits reviewed in *CMAJ* in 1940 as a treatment for various inflammatory conditions of the kidneys including Bright's disease.[20] The first case was performed by Harrison, of England, in 1878, but was elaborately discussed for the first time by Edebohls in 1901, who later received credit in conceptualizing this surgery.[21] It is not clear if Groves was aware of these reports at the time he published his first case, but through this publication, he introduced novel concepts regarding parenchymal compression, impaired blood flow and renal failure that were unrecognized concepts at that time.

To Groves, the inability of the kidneys to secrete any urine stemmed from their encasement in the inelastic capsule. Therefore, as the kidneys swelled from intense congestion and inflammation, they were unable to function on account of pressure. Although surgical capsulotomy has not been proven to be beneficial to treat nephritis or pyelonephritis, Groves clearly had a grasp of renal physiology and surgical principles that were not well-described until Page published his physiology paper in 1939.[22]

Renal calculi

As a general practitioner, Groves developed principles for disease prevention. Early in his career, he published a paper on the etiology of renal calculi and treatment strategies.[23] Although based on other authors' works, his understanding of urolithiasis was remarkably advanced.

In his publication, he approached many different aspects of this disease. He mentioned the inadequate supply of milk as a cause for stone formation in certain population. He also stated that the hardness of the water increases the risk for stone formation and noted that foreign bodies can act as a nucleus for stone formation.

He concluded this paper by addressing the treatment of renal colic. Belladonna, opium and warm baths were part of the regular treatment. He advised the administration of an anesthetic in every case in which pain was too severe. Blood letting performed during this era was condemned by Groves and deemed to be entirely unnecessary. Finally, he suggested that regulation of diet, drinking considerable quantities of lime-free water, exercise and avoidance of alcoholic liquors could prevent stone formation.

Conclusion

Groves' adoption of aseptic surgery enabled him to develop a very complex surgical practice that including a well-developed practice in urology. However, his impact was reduced by nature of the environment in which he worked and by the limited circulation of the journals in which he chose to publish. If Groves had Osler's opportunity and foresight to write a book entitled *Principles and Practice of Urology* in 1892, we may have considered him to be a founding father of modern urology.

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A true surgical pioneer

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I would like to congratulate and thank the authors for contributing what I believe to be the first significant paper on the history of urology published in the *Canadian Urological Association Journal*.[1] The relatively unknown Dr. Abraham Groves is an excellent choice.

Dr. Groves was a true surgical pioneer (Fig. 1). With his early adoption of the concept of asepsis and his remarkable comprehension of surgical principles, he was able to safely perform procedures unavailable in major centres. This is quite remarkable when he really had only 6 months of surgical training. In his time, a surgical apprenticeship usually involved just watching the professor and accepting his word as dogma. A lot has changed!

Dr. Groves did publish a number of articles on his accomplishments, but only in local journals. As a result few people know of his accomplishments. It is truly unfortunate that he did not work in a more academic environment where his knowledge would have been better recognized and disseminated; if so, more people could have learned from his skills.

Dr. Groves could easily be considered the Father of Canadian Urology.

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Fig. 1. Dr. Abraham Groves, circa 1931 (Wellington County Museum and Archives, ph 11728).

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