

# An Italian Experience Delving Inside the Wrist

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Choices are not always made according to a foreseen logic. I owe my education and training to Modena University's Orthopedic and Hand Surgery department, but my arrival there was completely fortuitous. In my 5th year of school of Medicine and Surgery, I began to attend the orthopedic department as a volunteer and it is in this time period that I came into contact with the hand surgery department. Unfortunately, Augusto Bonola (►Fig. 1<sup>Q1Q2</sup>), founder of the Modena University's Hand Surgery department and also founder of the Italian Society for Surgery of the Hand (SICM, 1963 (►Fig. 2<sup>Q3Q4</sup>)), had just passed away 1 year before I entered into the orthopedic clinic and I did not get a chance to meet him, but fortunately, his successor, chief of staff, Paolo Bedeschi (►Fig. 3<sup>Q5Q6</sup>), gave me permission to prepare my Medicine and Surgical graduation thesis concerning "Early mobilization of finger flexor tendons after undergoing a tenorrhaphy."

By end of 1978, I began my orthopedic internship which lasted 5 years and gave me the opportunity to attend the clinic alongside Italian hand surgery pioneers: A. Bonola, P. Bedeschi, A. Caroli and L. Celli.<sup>1</sup>

(1979–1986). In this time period, I developed an interest in upper extremity peripheral nerve surgery and in two years I obtained a specialization diploma in clinical neurophysiology and electromyography. I owe much thanks to Prof Rudolf Schoener (►Fig. 4) for his inexhaustible help. I evaluated nerve compression and injuries from the clinical neurophysiologic phase up until the surgical treatment (microsurgery and palliative transplants) and then through to the patient's follow-up outcome results. In the first years my work was primarily clinical but I also participated in a few scientific studies.<sup>2</sup>

I began to follow the patients with brachial plexus injuries and performed neurophysiologic intra-operative functional nerve root assessment<sup>3,4</sup> using somatosensory potentials, which was initially proposed by<sup>5</sup> the chief surgeon (L. Celli).

The Hand Surgery teaching course that was initially proposed by Bonola (1964) (►Fig. 5<sup>Q7Q8</sup>) were routinely held at Modena University's Policlinic Bonola Auditorium and many

times there were over 200–300 participants. The wrist was only partially discussed as one topic amongst all the many hand surgery topics presented and it was taught only under the aspect of traumatic pathologies, post-traumatic pathologies and rheumatology. Microsurgery was another branch of hand surgery that I embraced and began when, my colleague, Antonio Landi returned from St Vincent's Hospital, Melbourne, Australia (early '80 years). I was able to finish the microsurgery training course in almost one year and began clinical digital and upper extremity re-implantation. Such conditions permitted me to work continuously from the afternoon into the night and early morning. In the orthopedic clinic and in general in Italy, there were no cadaver laboratories, so many times the amputated parts that could not be re-implanted were preserved and utilized for anatomical dissection from a surgical point of view. Also in this period I had surgical experiences of performing a free digital transfers and cutaneous limb coverage using a new free microvascular flaps.

My nerve injury research studies continued producing optimal results.<sup>6,7</sup> In those years the studies on carpal tunnel syndrome, which were published by Kimura, describing the inching technique<sup>8</sup> turned previous published research upside down and this led me to deepen my knowledge and research on the median nerve's initial site of compression inside the carpal canal. I presented one of these studies at the Italian National Hand Surgery Congress (1986) in Giardini Naxos, Taormina (Sicily - Italy) at which time another surgeon, Peter Nathan (►Fig. 6<sup>Q9Q10</sup>), Hand Surgery Department Portland (Oregon, USA) ASSH member, simultaneously presented a similar paper at the same congress. After our presentations we shared our findings and thus began a close scientific collaboration in this specific field and also developed a very long-term friendship<sup>9</sup> both of which led me to travel back and forth to the USA. My endo-canal compartment pressure study was the beginning of my further research in this specialized field (►Fig. 7<sup>Q11Q12</sup>). I therefore, decided to go to Sweden and pay a visit to the experts (Urban Rydholm in Lund, Richard Wallenstein in Stockholm and Jorma Styf in

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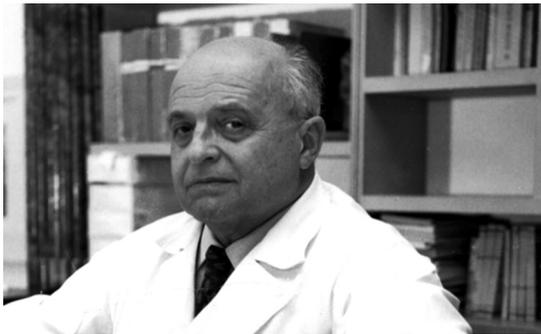
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**Fig. 1** Professor Augusto Bonola.



**Fig. 3** Professor Paolo Bedeschi.

Goteborg), to improve my understanding and knowledge concerning the evaluation technique for measuring compartment pressure (→Fig. 8<sup>Q13Q14</sup>). The results that I obtained in my following studies demonstrated an increase in pressure in the canal's distal center directly correlated to the initial site of neurophysiologic symptoms.<sup>9</sup>

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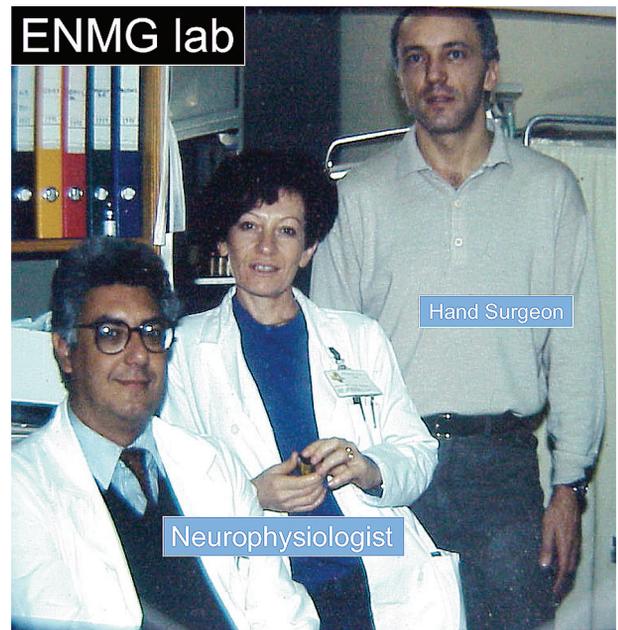
At the same time that I was pursuing my interest in neurophysiology and microsurgery (1985), I also began to pursue my hidden interest in the wrist. I was attracted to a proximal row carpectomy by a volar approach technique which favored better range of motion functional recovery than other techniques.<sup>10</sup> Bedeschi encouraged me to study this technique and collaborate with him, and doing so, we ended up publishing more than one scientific article concerning this technique's important indications for specific degenerative post-traumatic wrist pathologies.<sup>11</sup>

Since I had not been hired either as a hospital employee nor by the University and having finished two specialties

(1986), the time arrived for me to leave Modena University's Orthopedic Hospital. In those years the intern was not paid even if the law had established that the intern should be paid and employed within the department where they worked. So, for all the 10 years that I worked in the department it was completely voluntary and I was economically supported by my family, and at the same time, they also had the responsibility of both my wife and daughter. In the following years, the law for those who entered into an internship were strictly implemented, but in my situation, I had no title and could not stay there any longer.



**Fig. 2** (a) The gate of the Sant'Agostino Hospital (Modena) (b) from which the SICM logo derive.



**Fig. 4** EMG laboratory with three neurophysiologists (two neurologists): Professor Rudolf Schoenhuber, Di Donato Grazia, MD, and Riccardo Luchetti, MD, orthopaedic surgeon.



**Fig. 5** View of the main entrance of the hospital in which was held the first "A. Bonola" Hand Surgery Course (1964).

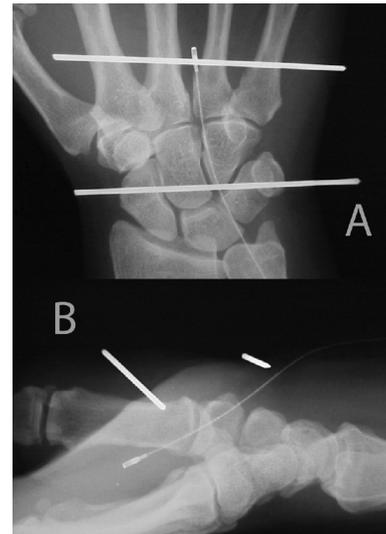
(1989–2000). After a three month temporary work period (Research Doctorate) at Rizzoli Institute in Bologna, I was called by the San Marino Republic's Health Department and after many vicissitudes we were able to open the State Hospital's Orthopedic Department. San Marino is only 30 km from Rimini, my hometown and finally I was able to return home!

In those years (1989) I had already began my interest in wrist arthroscopy, which actually has ended up in a fatal attraction for wrist pathologies. In this same year, James Roth, who had already been visited by my colleague Luigi Pederzini, came to San Marino and we organized a small wrist arthroscopy course. Soon after that, I published my first two articles regarding wrist arthroscopy.<sup>12,13</sup>

In 1991 I became an international member of the ASSH and Julio Talesnik and Michel Merle were my sponsors. In 1995 I



**Fig. 6** Peter Nathan, MD.

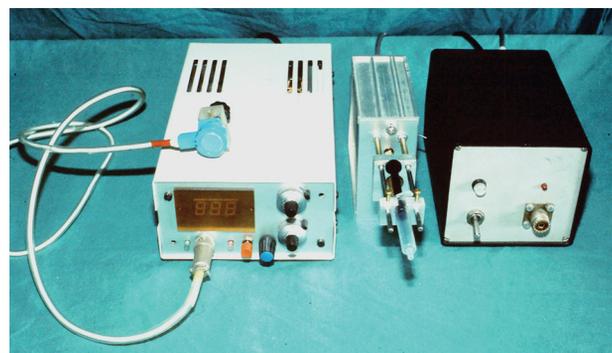


**Fig. 7** (a) AP and (b) lateral X-ray views of the wrist with catheter into the carpal canal.

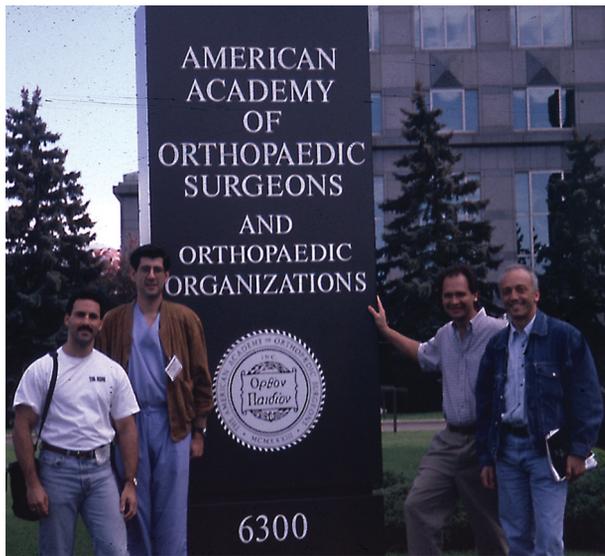
participated in a wrist arthroscopy course in Chicago where I made friends with three hand surgeon colleagues who are now internationally well-known (→ **Fig. 9**): Alejandro Badia, Francisco del Pinal, Jorge Orbay. At the same course I remember being intrigued by Richard Berger's presentation on trapezio-metacarpal arthroscopy and it was only two years later that we published an article together regarding this arthroscopic technique.<sup>14</sup> Wrist arthroscopy opened doors for me to study wrist pathologies in a much more scientific and complete way. This led me to publish many scientific research papers in the following years. The first one I published was in collaboration with two colleagues from the Miami Hand Center.<sup>15</sup> By 1998, I had accumulated a significant amount of clinical case experience in proximal row carpectomy via the volar approach (→ **Fig. 10**<sup>Q15Q16</sup>) and that led me to publish my outcome results.<sup>16</sup> The volar approach permitted wrist rehabilitation to begin early-on, thus resulting in improved wrist range of motion as compared with the dorsal approach. The volar approach is permitted in the cases where there is no doubt regarding the carpal or

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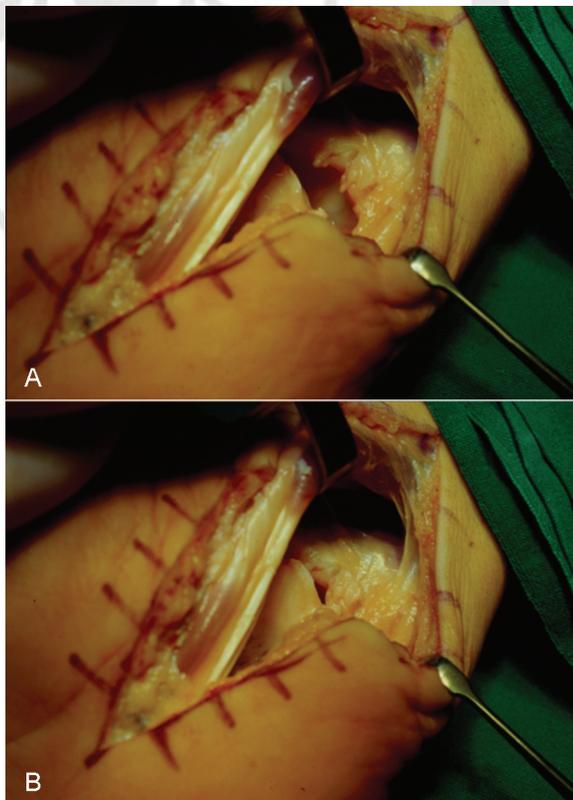


**Fig. 8** Prototype of special instrumentation for constant pressure measurement.



**Fig. 9** Pictures taken at the AAOS and ASSH wrist arthroscopy course held in Chicago (1995). Left to right: Alejandro Badia, Francisco del Pinal, Jorge Orbay and Riccardo Luchetti.

radius bones' cartilaginous integrity, therefore, a pre-surgical arthroscopy plays an important role in the pre-surgical diagnosis. Although the volar wrist and carpal ligaments are sutured after a proximal row carpectomy, mobilization



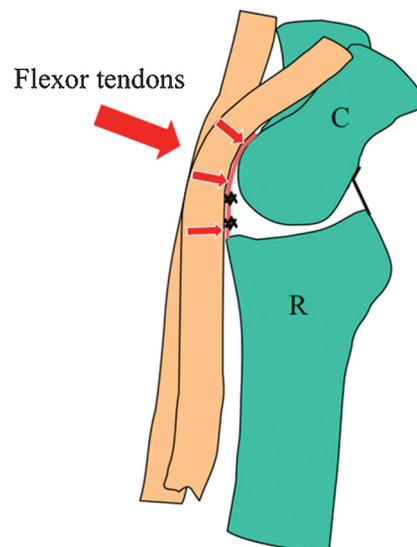
**Fig. 10** Intraoperative images of proximal row carpectomy. (a) Resection of the first row and (b) the capitulum close to the lunate facet of the radius.

can begin passively and/or actively, even as soon as, the day after surgery. The flexor tendons protect the capsulo-ligamentous layer at rest and during mobilization (►Fig. 11<sup>Q17Q18</sup>). The wrist should be positioned in 25° of extension in a thermoplastic splint to favor good functional wrist recuperation since the extended wrist position prevents volar capsular retraction, which could reduce wrist extension range of motion. One of my studies compared the functional outcome differences between the volar and dorsal approach to proximal row carpectomy and confirmed that the volar approach obtains very valid wrist functional outcome results.

In the meantime, my experience and research concerning carpal tunnel syndrome brought me to a stage where I decided to write two books regarding this pathology; one in Italian<sup>17</sup> and the other in English five years later.<sup>18</sup>

By the middle 90's I began collaborating with a very talented surgeon from the Verona Hand Surgery Department, Andrea Atzei (►Fig. 12<sup>Q19Q20</sup>) and from there we began a fruitful long-term voyage inside the wrist. Together with Atzei, we published the first book on wrist arthroscopy in Italian<sup>19</sup> which also included a CD-ROM multimedia containing more than 40 videos on wrist arthroscopy. From there, we constructed a wrist arthroscopy web-site and founded a wrist pathology study group within the Italian National Society of Hand Surgeons (SICM) (►Fig. 13). In the same period, another colleague became part of our study group, Pier Paolo Borelli (►Fig. 14<sup>Q21Q22</sup>). Borelli was, and still is, a source of innovative ideas and he developed a cannulated Herbert screw, a modified jig for scaphoid fixation with the Herbert screw and a particular traction tower for wrist arthroscopy that together, with these innovative ideas, has helped to keep our group afloat.

From 2003 up until now, together with Atzei, we have developed a Wrist Arthroscopy and Arthroplasty Course, that



**Fig. 11** Drawing showing the palmar side of the wrist after first row resection. Volar capsule was sutured and the flexor tendon "cover" the radio-capitate joint and the capsule.



**Fig. 12** Andrea Atzei, MD, vice-president of EWAS.



**Fig. 14** Pierpaolo Borelli, MD.



**Fig. 13** Italian group for the study of the wrist pathology. (1) Luchetti, (2) Baldrighi, (3) Borelli, (4) Zanlungo, (5) Nienstedt, (6) Ceruso, (7) Atzei, (8) Poggi, (9) Grippi.

initially was held in Verona and Barcelona (Spain). In 2005 the course only took place in Barcelona in collaboration with two precious colleagues, Marc Garcia-Elias and Manel Llusà. Each successive year this course has invited internationally known wrist arthroscopy specialists such as: A Badia, W Geissler, T Lindau, C Mathoulin, H Krimmer, P del Pinal, D Slutsky, R Zimmerman, G Herzberg, M Gabl, and J Yao. The course has been so successful that it immediately entered into the EWAS (European Wrist Arthroscopy Society founded in 2005 and of which I was President in 2007) circuit of wrist arthroscopy courses.

In these years there has been an ongoing discussion between myself and Andrea Atzei concerning the types of triangular ligament lesions and which type of surgical procedure is better for repairing the ligament. Atzei formulated, under the auspice of EWAS, a sub-division of type 1B triangular ligament lesions which modified and improved the already established Palmer classification.<sup>20-22</sup>

In recent years arthroscopic surgical techniques are more frequently performed and have created a “competition” between the surgeons’s choice to use open versus arthroscopic techniques. Wrist arthroscopy has brought about enormous benefits regarding wrist pathologies and their treatment associated with initiating early on rehabilitation.<sup>23,24</sup> Arthroscopy has permitted us to truly delve inside the wrist and begin to understand the complexity of wrist injuries, while also producing various technical solutions for its repair in proportion to the severity of wrist injury, while at the same time, reducing the duration time of rehabilitation. At the same time, open surgical techniques have become much more “mini-invasive” with a tendency to produce results similar to arthroscopic techniques. For instance, open mini –invasive surgical techniques, alongside those arthroscopic repair techniques of the triangular and/or scafo-lunate ligament<sup>25</sup> render similar result, as you can see in publications such as those listed in my bibliography.<sup>26</sup> These results are also valid for ligament reconstruction techniques<sup>27</sup>; and for salvage procedures.<sup>28</sup>

Nevertheless, some surgical wrist techniques are, and remain to be, dominated by the open technique. In my opinion, derived from my personal experience, I have arrived to the point in which I suggest that: open surgery should never be abandoned completely for only arthroscopic surgery.

I would like to close this article with a message to those who have taken the time to read it: what you need to grow as a surgeon is: the thirst for knowledge, the desire to look for it in every corner that is both near and far to you and then the will to go forth and satiate this thirst.

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