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Review Article

Meningiomas Surgery in Italy in the Nineteenth Century: Historical Review

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Abstract

The meningiomas occupy a very important role in the history of neurosurgery. This work refers the remarkable contributions of Italian authors in the early ages in the surgery of these tumors.

Through an extensive literature review it was possible to find at least twenty-two cases operated on in Italy in the nineteenth century.

The author emphasizes the pioneering aspects of the operations performed by Andrea Vacca'Berlinghieri (Pisa, 1813), Zanobi Pecchioli (Siena, 1835), Francesco Durante (Rome, 1884), and Guido Bendandi (Bologna, 1895). These cases are widely mentioned in the international literature on meningiomas, but other cases reported here were not cited in published reviews.

It should be stressed that the results recorded in the cases examined in this study were generally positive, with a mortality rate of 28.6% and a good outcome in 71.4%.

Although the literature has been extensively reviewed for this work, the research cannot be considered complete; likely at that time other cases of meningiomas were surgically treated in our country and it is realistic to believe that not all have been published.

Keywords: Meningiomas surgery; Italy; Nineteenth century

Introduction

In Italy the surgery of cranio-cerebral tumors began in the nineteenth century, thanks to the courage and the value of some great general surgeons.

At the beginning only tumors with extracranial expansion or those causing changes in the overlying skull could be diagnosed and occasionally removed; in the last decades of the century, the progressive knowledge on the localization of brain functions, made possible the diagnosis of tumors even in the absence of external manifestations, based on neurological signs and symptoms; the introduction of anesthesia, asepsis and antisepsis allowed sometimes to remove also neoplasms with intracranial location alone.

Undoubtedly, the meningiomas occupy an important place in the history of brain tumors and, therefore, in the history of neurosurgery; before all, the meningioma, a term coined by Harvey Cushing in 1922 and variously called first (fungoid tumor of the dura mater, sarcoma, endothelioma, fibroma, fibrosarcoma, psammoma) is the brain tumor known for the longest time, since ancient times, as it could result in changes of the skull. For this reason the meningioma also represents the first brain tumor for which the operative practice was possible.

The first attempts to surgically treat the meningiomas date back to the mid-eighteenth century; however, their surgical removal substantially began in the 19th century.

It should be recognized to Italians a remarkable historical role in the meningiomas surgery. In this paper the main contributions of Italian authors are reported; some are considered important enough to be mentioned not only in works that have analyzed specifically the role of our compatriots in the historical evolution of neurosurgery [1-7] but also in many publications of the international literature on intracranial meningiomas, particularly on their historical aspects [8-12].

Review

For the present study many text-books and works on the history of the neurosurgery, in particular on the part of the surgery of meningiomas have been consulted; furthermore, a search was made using Pubmed and Pubmed central.

Through this review methodology I found at least twenty-two cases of meningiomas surgically treated in Italy in the nineteenth century. Table 1 shows a summary of the most important data of these cases [13-38].

It is necessary to specify that the table shows the pathologic definition used by the authors in each case, since at that time was not yet proposed the term meningioma; the tumor was considered likely to be meningioma based on the surgical report of each case indicating the dural attachment of the tumor and in accordance to the "history of the nomenclature of meningioma" listed by Al-Rodhan and Laws [8]. The most significant cases listed in the table are here described with more details.

The first author to mention is ANDREA VACCA' BERLINGHIERI (Figure 1), born in Montefoscoli (Pisa) on February 3, 1772 and died in Orzignano (Pisa) on September 6, 1826, Professor of Surgery at University of Pisa. Among his many works here is of interest the

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Table 1: Summary of cases.

Surgeon	Year of Surgery	City	Tumor	Result
Andrea VaccàBellinghieri [13]	1813	Pisa	Sarcoma of the dura mater at synciput	?
FilippoPalazzi [14]	1827	Bologna	Sincyputendotelioma	Death
ZanobiPecchioli [15]	1835	Siena	Synciput ulcerated fungus of the dura mater	Recovery
Giovanni Valeriani [16]	1875	Bologna	Large frontal sarcoma eroding the bone	Recovery
GiacomoFilippoNovaro [17]	1879	Turin	Skull periostal sarcoma with intracranial expansion	Recovery
GiacomoFilippoNovaro [18]	1883	Turin	Frontal hyperostosing tumor	Death
Francesco Durante [20]	1883	Rome	Fibroma of the cranial base extending into the nasal fossa	Recovery
Francesco Durante [20-24]	1884	Rome	Olfactory groove fibrosarcoma	Recovery
Francesco Durante [25]	1898	Rome	Rolandicfibrosarcoma	Recovery
AzzioCaselli [26]	1886	Genoa	Myelogenic sarcoma of the bregma with dural involvement	Improvement
Felice Celli [27]	1891	Cremona	Rolandicendotelioma	Death
Paolo Postempski [28]	1891	Rome	Rolandicendotelioma	Recovery
Paolo Postempski [29]	1892	Rome	Frontal sarcoma	Recovery
RaffaeleBastianelli [30]	1895	Rome	Anterior cerebral fossa sarcoma	Recovery
EmidioTassi [31]	1895	Rome	Sarcoma of parietal dura mater	Recovery
EmidioTassi [31]	1895	Rome	Tuberculum of temporal dura mater	Recovery
Guido Bendandi [32-34]	1895	Bologna	Cerebellopontine angle fibroma	Improvement
Guido Bendandi [32]	1898	Bologna	Falxendotelioma	Death
Eugenio Casati [35]	1896	Fermo	Fronto-parietal sarcoma	Death
Alberto Codivilla [36]	1896	Imola	Frionto-basal sarcoma	Recovery
Vittorio Marchi [37]	1897	Jesi	Cerebellar endotelioma	Death
OrazioD'Allocco [38]	1899	Fermo	Rolandic sarcoma	Improvement

manuscript Trattato di Chirurgia Pratica, 1813 [13], never published, probably dictated to one of his students; its discovery was made accidentally by David Giordano, who referred in detail in an article on surgeon of Pisa [39].

The manuscript consists of 488 pages, with distribution of the chapters "from head to feet". The Treatise begins precisely with the head surgery where Vaccà Berlinhieri first dwells upon the practice of trephination and then, in the words of Giordano, "rises to greater boldness in the treatment of sarcomas of the dura mater." Indeed, a patient with meningioma underwent surgical excision in Pisa is described.

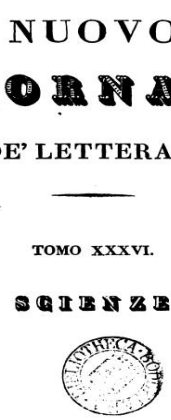
Until then, the treatment of these tumors was limited to cautery, or, at most, to the epidural excisions or ligatures, procedures clearly insufficient; Vaccà Berlinhieri proposed and performed a most radical operation, albeit very bold. After a craniectomy with five or six burr holes on the outskirts of the fungus, the tumor was removed together the dura mater from which it originated, tying the cut vessels.

As observed by Vittorio Sironi [40], it was the Author's credit that he described in detail the technique to dominate the copious bleeding during tumor removal; if the meningeal artery is damaged, VaccàBerlinghieri advised to occlude it by bending onto the edge of the bone a lead sheet coated with rosin or agaric or keeping a small feather over the mouth of the vessel. The precise location of the tumor and the surgical outcome is not known.

Andrea VaccàBerlinghieri was the first to consider a previous head injury as a possible cause of a meningioma; this pathogenic hypothesis was suspected later also by other, including Harvey Cushing [41] and the question is still debated and not resolved [42].

To another Italian, ZANOBI PECCHIOLI, it must be assigned an even more significant role, since he was the first to remove successfully a meningioma. Born in San Miniato (Pisa) in August 1801 and died in Florence in January 1866, Pecchioli was Professor of Clinical Surgery and Operative Medicine at Modena and then at Siena University.

Figure 1: Andrea VaccàBerlinghieri.



NUOVO

GIORNALE

DE' LETTERATI

TOMO XXXVI.

SCIENZE

PISA

TIPOGRAFIA NISTRI

1838.

Figure 2: Cover page of the Journal "Nuovo Giornale dei Letterati" (Pisa, 1838).

Storia di un fungo della dura madre, operato coll'estirpazione dal Professore Zanobi Pecchioli.

Uno dei grandi vantaggi che può l'uomo arrecare a coloro che una data scienza professano, si è il portare al loro giudizio in esame dei fatti riguardanti la loro scienza medesima, in special modo quando di essa un punto non ancora bene dilucidato interessano.

Persuasi, e vinti da questa verità, credemmo bene che non dovesse nel silenzio, e nell'oblio rimanere la cura di un antico, e vasto fungo della dura madre, onde presentandosi altri infelici affetti da tanta terribil malattia, non andassero sconsolati ed afflitti per non poter riportare quei sommi e larghi sollievi, che in altri casi arrecar puote la chirurgia, oggimai ingigantita di tanto, da essere spesso per l'inesorabil morte lo scoglio di naufragio, e l'aureo tempio santissimo della salute.

Fu adunque nel 27 Luglio 1835 ricevuto nella sala clinica chirurgica di Siena Giovanni Baldi di anni 45, di professione coltivatore, che nel suo generale stato di salute non presentava notabile modificazione.

Egli aveva in tutta la regione del sincipite destro un vasto tumore della profondità di circa un pollice e mezzo, e circoscritto da linee poco distanti dai contorni del nominato osso; detto tumore era esulcerato in tutta la sua superficie, la quale era alterata da piccioli, e spessi bitorsolini e fissure, dalle quali ad ogni leggerissimo urto trepidava del sangue. Era però conformato in modo da far riconoscere che sul principio lo si doveva rinvenire di ristretta base, mentre lo si poteva rassomigliare ad un fungo con largo cappello. Detta espansione si era acquistata continuità colle parti molli, che di mano in mano toccava: apportando al paziente tal dolorosa sensazione, quale suol essere quella

Figure 3: First page of the paper reporting the Pecchioli's case.

In 1847 he published an account of surgeries performed during 16 years, from 1832 to 1847; 16 of the 1524 reported operations involved trephining of the skull. One of these interventions was carried out in Siena on July 29 1835 for the resection of a meningioma, defined fungus of the duramater. The case was not referred in the literature by Pecchioli but was described by theEditorial Board of the "NuovoGiornaledeiLetterati- Scienze", in 1838 [15] (Figures 2 and 3).

The clinical history of a 45 year old man is reported: the patient "had in the whole region of the right sincyput a large tumor, about an inch and a half deep, surrounded by lines not far from the margins of the above-mentioned bone. The entire tumor surface was ulcerated … it was so shaped as to suggest that originally it must have had a narrow base and looked like a mushroom with a broad cap". The patient suffered "from long term severe headache", exacerbated by digital compression of the mass for which Pecchioli advanced the diagnosis of "a cancerous fungus of the dura mater."

The different steps of the operation can be summarized as follows: with a convex small knife the surgeon made an incision in the healthy soft tissue surrounding the tumor, dissected them and detached them together with the tumor. He removed from the bony surface of the parietal bone the entire exophytic portion of the tumor ("that portion of the fungus lying outside of the cavity") and, therefore, removed the pericranium and the eroded bone. Since the resulting bone defect was not large enough to reveal the limits of the lesion Pecchioli drilled three separated holes and then joined them to obtain an large triangular craniotomy, thus exposing the mass which was removed together with the dural insertion, leaving the underlying arachnoid exposed in large zones. Over the extensive opening was placed an artificial integument of fine linen soaked in sweet almond oil.

The operation, that "was impressive, painful and long-term", was followed by full recovery; the patient survived and was followed for more than 2 years; he was in good health and showed no evidence of recurrence.

The article concludes with a note of the Editorial Board of the Journal:" the operation carried out in the Amphitheatre of Siena seems to be the first that has actually been operated on. This is a panegyric to the glory of Italian surgery and clearly demonstrate that the Italians are not inferior to the peoples other side of the Alps."

As said, historically this is the first reported successful removal of a meningioma [4,8,9,11,40,43]. In 1840, this intervention was chosen for the competition to the Chair of Clinical Surgery at University of Paris.

Of note are also two cases operated on in Turin, in 1879 and 1883, by GIACOMO FILIPPO NOVARO; he was born in Diano Marina (Imperia) on May 1, 1843 where died on September 5,1934; he devoted himself to academic career, first at the University of Turin, later was Professor of Clinical Surgery at Siena, Bologna and finally Genoa Universities.

Once again the diagnosis of the tumor was based on the irregularities of the skull; the first patient recovered after the excision of a skull periostal sarcoma with intracranial expansion; the second patient, suffering from seizures due to a parasagittal frontal hyperostosing meningioma, died one hour after the operation because of acute anemia due to a profuse intraoperative bleeding, from the diploe and especially from the superior sagittal sinus, despite the surgeon before dissecting the mass had proceeded to apply two

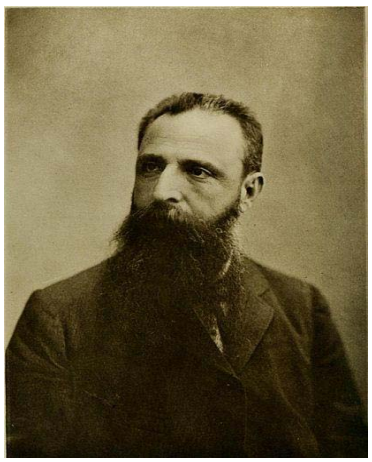


Figure 4: Francesco Durante.

hemostatic forceps on the longitudinal sinus, one forward and the other back of the tumor.

In this time appeared the essential contribution by Sicilian surgeon FRANCESCO DURANTE (Figure 4). He was born in Letojanni (Messina) on June 29, 1844 where died on October 2, 1934; Durante was Director of the Surgical Clinic of Rome University and an outstanding leader of the Italian surgery for a very long time; certainly he was a pioneer of Italian Neurosurgery [1-7]; to Durante is recognized an historical role in the development of Neurosurgery and, in particular, in the surgery of meningiomas.

Durante was the first to successfully remove a brain tumor (olfactory groove meningioma) diagnosed only on clinical evidence.

However, it should stressed that he, before the operation that made him universally known, successfully carried out a special operation for a tumor, having respected a meningioma (defined by the author "fibroma") of the skull base extending into the nasal cavity, using an original transpalatin approach; the case was referred to Medical Academy of Rome [19].

Francesco Durante's fame is linked to the intervention performed in Rome on June 1, 1884 on a 35 years old woman whose symptoms (anosmia, psychic disorders, protrusion of the eyeball) allowed the exact diagnosis of intracranial tumor sited in frontal region that was surgically removed.

The case, and the patient, was presented, at the Meeting of the Italian Society of Surgery and a few months later at the Royal Academy of Medicine of Rome [20].

The operation was presented, a few years later, in September 1887 at the Surgical Section of the International Medical Congress of Washington [21] and in the same year was published in the Lancet [22] (Figure 5).

Some passages of the text of this historic publication are transcribed here: "In May, 1884, C.B,, a woman, thirty-five years of age and a native of Narni, came under my care…The course of disease, the loss of memory and of the sense of smell, and the objective and subjective state of the patient led me to believe in the presence of a tumour within the cranium, the pressure of which affected the

CONTRIBUTION TO ENDOCRANIAL SURGERY.[1]

By F. DURANTE,
PROFESSOR OF SURGERY.

In May, 1884, C. B——, a woman, thirty-five years of age and a native of Narni, came under my care. Her general appearance was good; she seemed well nourished, although not of a very robust constitution. Externally, she showed no abnormality, except as to her left eye, which appeared somewhat low and drawn outwardly, otherwise the movement as well as the functions of the globe were normal. This deformity had manifested itself only within the three months previous to her visit to me. For a year or more, however, she had entirely lost her sense of smell, her memory had become impaired, particularly as to remembering names, and she experienced a peculiar sensation of vacuity which caused her to feel uncertain in her movements. Motion, sense of touch, and sensibility to heat and pain remained natural. From her husband I learnt that she had somewhat changed in disposition; that from being generally happy and bright, she had become sad, melancholic, and taciturn, although she did not seem to brood over the state of her health. The senses of hearing and taste, and the functions of the chylopoietic viscera were perfect; also nothing abnormal was found on a close examination of the nasal and pharyngeal regions. The course of the disease, the loss of memory and of the sense of smell, and the objective and subjective state of the patient led me to believe in the presence of a tumour within the cranium, the pressure of which affected the anterior lobe of the brain and paralysed or destroyed the olfactory nerve. Moreover, the displacement of the globe of the eye led me to believe also that the tumour had penetrated the superior arch of the orbital cavity. Such being my diagnosis, I now proposed to the patient an operation that would remove the offending object, explaining to her the gravity of the operation without reserve. She was brave, and she consented.

To reach the tumour it was necessary to make a large opening in the left frontal bone; so with an incision commencing from the inner angle of the left orbit upwards nearly to the hair line as far as the temporal region, I raised all the soft tissue from the bone in a flap. The bone being exposed, with a sharp scalpel and hammer I removed a large portion of it, commencing at the superior orbital margin, inferiorly, and found that the internal parietes of the frontal sinus had been forced outwardly. The dura mater being now exposed, I examined it, and found that it had been perforated by the tumour just opposite the frontal eminence. With great care I now began to scoop out the tumour. As soon as a considerable portion of the tumour was removed, I detected that it did not adhere beyond the internal surface of the dura mater, and that therefore its enucleation was comparatively easy; and then removed it and carried with it all the adherent portions of the dura mater. The hæmorrhage was slight and easily controlled by the hæmostatic, a tampon treated with sublimate. The tumour was lobular, of the size of an apple, and weighed seventy grammes. It occupied the anterior fossa at the base of the left cranium, extending to the right and upon the cribriform lamina, which it destroyed. Posteriorly it extended to the glenoid tubercles before the sella turcica. The left anterior cerebral lobe was greatly atrophied; the

[1] Paper read in the Surgical Section of the International Medical Congress held at Washington, U.S.A., September, 1887.

Figure 5: Durante's article on the Lancet.

anterior lobe of the brain and paralyzed or destroyed the olfactory nerve. Moreover, the displacement of the globe of the eye led me to believe also that the tumor had penetrated the superior arch of the orbital cavity. Such being my diagnosis, I now proposed to the patient an operation that would remove the offending object, explaining to her the gravity of the operation without reserve. She was brave, and she consented.

To reach the tumour it was necessary to make a large opening in the left frontal bone … The dura mater being now exposed… With great care I now began to scoop out the tumour. The tumour was lobular, of the size of an apple, and weighed seventy grammes. It occupied the anterior fossa at the base of left cranium, extending to right and upon the cribriform lamina, which it destroyed. Posteriorly it extended to the glenoid tubercles before the sellaturcica … On the fifteenth day the patient returned to her home, doing very well.

Three months after I presented my patient to the Chirurgical

Society at its meeting in Perugia in 1884. She was in a happy frame of mind, and willingly related her experience. She stated that now all of her faculties and moral condition were normal, and that she had even regained her sense of smell. This greatly surprises me, for I felt sure that I had destroyed the left olfactory in removing the tumour, which had destroyed the cribriform lamina of ethmoid. Upon experimenting, however, with aromatic substances, we found that she could only smell with the right, and that the left was totally insensible, its olfactory having been destroyed either by the pressure of the tumour or by the operation itself. The part of the bone which had been removed was now partially reproduced, the cavity in the region of the operation had disappeared, and the eye had regained almost entirely its normal position. The tumour, under the microscope, presented a multiform fibro-cellular structure of sarcoma.

It is now four years since that operation was performed, and my patient is in perfect health. My diagnosis and the operation, apparently so hazardous at the time, are therefore justified by the result. And, though such operations have generally failed, the success of mine should secure proper consideration at the hand of modern surgery.

The progress of experimental pathology and of studies of cerebral localization every day now smoothes our way to the diagnosis of cerebral diseases, so that the cranial cavity may in future justly enter into the dominion of surgery. The frontal and parietal regions can now be successfully attacked by the scalpel of the surgeon, and many affections of the meninges become trophies of rational surgery".

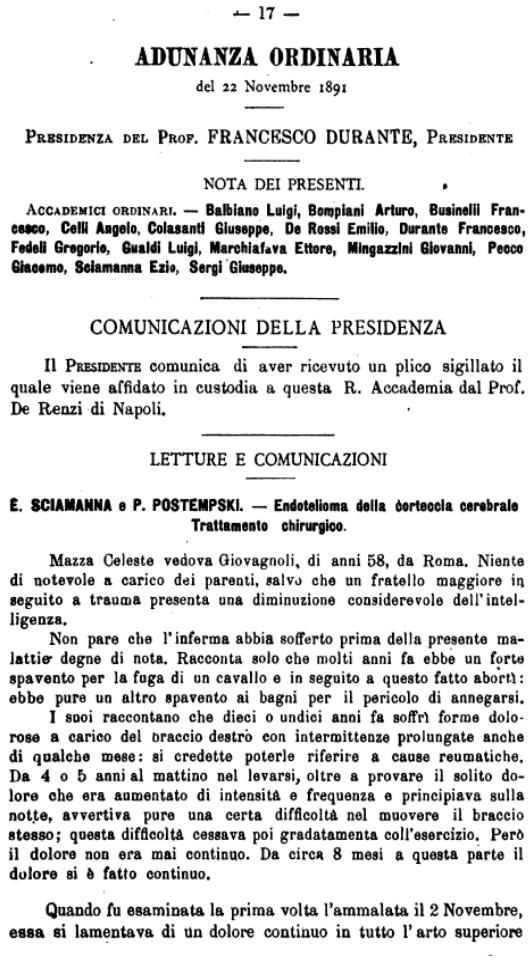
The patient, after many years, in March 1896, underwent new surgery for tumor recurrence, which was in detail reported by Durante in a publication of the Proceedings of the Italian Society of Surgery of 1896 [23] and in his Treatise of Surgical Pathology [24]. The postoperative course was excellent: the patient was discharged in complete physical, moral and intellectual health and survived at least ten years after the second operation.

Durante surgically treated at least another case of meningioma: a large left fronto-parietal dura mater sarcoma, once again successfully [25].

As can be seen in Table 1, other cases of meningiomas were treated by surgery in Italy during the period considered in this review.

Some treaties of brain surgery [44-46] at that time, and recently Al-Rodhan et al. [8], cite a case of PAOLO POSTEMPSKI (Rome, 1851-1926), chief surgeon of Consolation Hospital in Rome and Professor of Pathology and Surgical Clinic of the University; he operated in Rome on 22 February 1891, a 54 years old woman who had developed gradually right brachial monoplegia and, after many years, frequent attacks of Jacksonian epilepsy, impaired speech, and mental disorders. The neurologist EzioSciamanna (Figure 6) formulated the diagnosis of a cortical tumor sited below the half of the ascending frontal, in proximity of the Rolandic region; Postempski excised the tumor, histologically classified as endothelioma. At discharge, after a few months from the operation, the patient, free from seizures, showed only a slight difficulty in movement of the hand [28] (Figure 7). In the following year Postempski successfully removed a frontal sarcoma [29].

Figure 6: Ezio Sciamanna.



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ADUNANZA ORDINARIA

del 22 Novembre 1891

PRESIDENZA DEL PROF. FRANCESCO DURANTE, PRESIDENTE

NOTA DEI PRESENTI

ACCADEMICI ORDINARI. — **Balbiano Luigi, Bompiani Arturo, Businelli Francesco, Celli Angelo, Colasanti Giuseppe, De Rossi Emilio, Durante Francesco, Fedeli Gregorio, Gualdi Luigi, Marchiafava Ettore, Mingazzini Giovanni, Pecco Giacomo, Sciamanna Ezio, Sergi Giuseppe.**

COMUNICAZIONI DELLA PRESIDENZA

Il PRESIDENTE comunica di aver ricevuto un plico sigillato il quale viene affidato in custodia a questa R. Accademia dal Prof. De Renzi di Napoli.

LETTURE E COMUNICAZIONI

E. SCIAMANNA e P. POSTEMPSKI. — Endotelioma della corteccia cerebrale Trattamento chirurgico.

Mazza Celeste vedova Giovagnoli, di anni 58, da Roma. Niente di notevole a carico dei parenti, salvo che un fratello maggiore in seguito a trauma presenta una diminuzione considerevole dell'intelligenza.

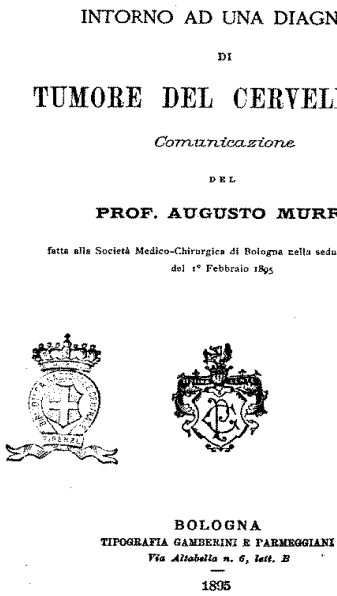
Non pare che l'inferma abbia sofferto prima della presente malattie degne di nota. Racconta solo che molti anni fa ebbe un forte spavento per la fuga di un cavallo e in seguito a questo fatto abortì: ebbe pure un altro spavento ai bagni per il pericolo di annegarsi.

I suoi raccontano che dieci o undici anni fa soffrì forme dolorose a carico del braccio destro con intermittenze prolungate anche di qualche mese: si credette poterle riferire a cause reumatiche. Da 4 o 5 anni al mattino nel levarsi, oltre a provare il solito dolore che era aumentato di intensità e frequenza e principiava sulla notte, avvertiva pure una certa difficoltà nel muovere il braccio stesso; questa difficoltà cessava poi gradatamenta coll'esercizio. Però il dolore non era mai continuo. Da circa 8 mesi a questa parte il dolore si è fatto continuo.

Quando fu esaminata la prima volta l'ammalata il 2 Novembre, essa si lamentava di un dolore continuo in tutto l'arto superiore

Figure 7: First page of Sciamanna and Postempski work.

A special mention should be given to the posterior cranial fossa meningioma operated upon in Bologna on 19 February 19, 1895 by GUIDO BENDANDI, from Forlimpopoli, Primary Surgeon at Maggiore Hospital in Bologna. A 17 years old boy suffered for many months of headache, vomiting, dizziness, staggering gait, scanning



INTORNO AD UNA DIAGNOSI

DI

TUMORE DEL CERVELLETTO

Comunicazione

DEL

PROF. AUGUSTO MURRI

fatta alla Società Medico-Chirurgica di Bologna nella seduta scientifica del 1° Febbraio 1895

BOLOGNA

TIPOGRAFIA GAMBERINI E PARMEGGIANI

Via Altabella n. 6, lett. B

1895

Figure 8: Cover page of Murri's publication.

speech, hearing loss and presented on clinical examination facial paralysis, ptosis, nystagmus; Augusto Murri, Professor of Medicine having special interest in neurology and in brain space-occupyng lesions, diagnosed a cerebellar tumor and referred the patient for surgery. Bendandi removed a cerebellopontine angle fibro-sarcoma; the intervention led to a significant improvement of the patient. The case was published by Murri [33,34] (Figure 8), who related the clinical picture and by Bendandi who described the surgicalreport [32]. This case assumes an historical character, being among the first posterior fossa tumors operated with a good outcome, enough to be quoted by Harvey Cushing [47].

I want to emphasize that in the cases treated during the last decades of XIX century the diagnosis was made not for the external manifestation of the tumor but on clinical picture; it is right to stress that essential to the surgeon in planning the operation was the contribution of the neurologist.

Discussion

To the meningiomas should be assigned a key role in the history of neurosurgery. Collin Mac Carty wrote: "if we were to designate an intracranial neoplasm that has had the most effect on the development of neurological surgery, very likely the intracranial meningioma would be prominently considered" [47,48]. Afterwards, the same concept was expressed also in other works devoted to the history of the meningiomas; for example according to Wang et Al "the evaluation of the diagnosis and treatment of meningiomas represent a microcosm of the evolution of neurosurgery. In many ways a meningioma is the soul of neurosurgery" [12] and so Okonkwo and Laws: "Meningiomas have been front and center in the evolution of discipline of neurosurgery. The current understanding and treatment of meningiomas represent the culmination of centuries of dedication by anatomists, pathologists, neurosurgeons and others to this ever-intriguing group of tumor. Patients will continue to benefit as contemporary neurosurgeons pursue their craft from the shoulders of giants before them" [11].

The Italians played a leading role in meningiomas surgery. Their contribution was very important, under certain aspects pioneering, both in the first stage, when could be operated only the tumors having an extracranial expansion or determining deformations of the skull, both in the next steps, starting from the last decades of the nineteenth century, when the introduction of anesthesia, asepsis and antisepsis and knowledge of cerebral localizations made possible the diagnosis and sometimes even the removal of tumors located exclusively in intracranial site.

I focused on some cases that in the international literature are considered "surgical milestones" in the history of meningiomas.

The contributions by Andrea VaccàBerlinghieri and Zanobi Pecchioli as pioneers in the surgery of meningiomas are recognized worldwide.

The historical importance of the operation performed by Francesco Durante was unanimously acknowledged [1-12,49,50]; his great historical achievement was also admitted by Harvey Cushing who in his famous monograph on meningiomas [41] writes on page 270: "chronologically the first successful operation for intracranial tumor was performed by Francesco Durante, professor of clinical surgery in the University of Rome".

About the Augusto Murri and Guido Bendandi case Cushing in his monograph on cerebellopontine angle tumors wrote, page 245, "Augusto Murri's clinical report is a most noteworthy one for the time" [47].

Some works on the history of meningiomas also cited the cases operated by Vittorio Marchi, Paolo Postempski, Azzio Caselli, GianFilippoNovaro while in the literature are not mentioned other cases included in this review.

For an accurate assessment of the cases surgically treated in Italy, a wide research on the international literature was made; in the same period have been published works on 50 cases operated on outside of Italy, in which the operative results is clearly reported: deaths were recorded in 18 cases, i.e. in 36%, and positive results in 64% (32 cases). Among the twenty-two "italian" cases the mortality rate was 28.6 % and a positive result was obtained in 71.4% (the postoperative outcome in VaccàBerlinghieri's case is unknown).

Conclusion

For this work an extensive literature review was carried out; however, the research cannot be regarded as complete. It is likely that the reported cases were not the only ones operated in Italy in the nineteenth century, perhaps because not all have been published.

Al-Rodhan and Laws [8] judged "surgical milestones in the history of meningiomas" the operations performed by Berlinghieri, Pecchioli, Durante, Marchi.

Above all Zanobi Pecchioli and Francesco Durante were early pioneers in meningiomas surgery [8,9,43,49,50-55].

Pecchioli for the first time successfully removed a meningioma ("fungus of the dura mater"); the lesion was a large ulcerated cranial outgrowth at the level of right sincyput originating from the dura and eroding the bone; Durante was the first to successfully remove a brain

tumor (olfactory groove meningioma) which had been diagnosed on clinical ground, thus providing contribution to the history of cerebral localization, especially of the function of frontal lobes.

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