

Epidemiological and etiological aspects of Infectious Rachiditis

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Abstract

Aim: The study aim was to provide an overview of epidemiological and etiological aspects of Infectious Rachiditis (IR) among adults in Albania.

Methods: The study included 93 cases with IR identified during the period 2006-2016 at the Infectious Diseases Hospital of the University Hospital Centre “Mother Teresa” in Tirana. IR diagnosis was based on the imaging data from CT and MRI examinations. Data regarding the clinical-biological manifestations for all cases were collected from patients’ medical files as well as laboratory and microbiological tests.

Results: Mean age of the patients was 54.4±7.7 years, with a range from 16 to 75 years. Sixty (64.5%) patients were males and 33 (35.5%) were females (ratio males/females was 1.8/1). Predisposing conditions were encountered in 58 (62.4%) patients. During the study period, 12 (13%) out of 93 cases were classified as nosocomial IR, thus, contracting the disease while being admitted in the hospital. The median time interval between the event and the clinical onset of nosocomial Rachiditis was 3.5 weeks with an interquartile range from 1.7 to 8.5 weeks. Regarding the etiological data, microbial agents were identified in 71 (76.3%) of the cases. A broad etiological specter was identified with *B. melitensis* and *S. aureus* being the most common cause in 45.1% and 19.7% of the cases, respectively.

Conclusions: Currently, we have advanced capacities for the diagnosis and management of IR, but our goal is to improve further the laboratory infrastructure, therapeutic protocols and a constant and long term follow-up of such cases.

Keywords: epidemiology, etiology, infectious rachiditis.

Introduction

Infectious Rachiditis (IR) is the affection of the components of rachides (vertebral column and surrounding tissues) from microbes (1).

Rachiditis represents one of the most difficult problems of actual medicine because of the real difficulty for establishing an exact diagnosis, clinical importance, complications and invalidations, as well as the necessity for applied algorithms for diagnostics and complex and prolonged therapeutic protocols or delicate neurosurgical interventions (2). In Albania, these important multidisciplinary pathologies are currently being identified more frequently.

The epidemiological and etiological aspects of the disease depend on different factors including the ones which are connected with the environments of medical centers. Their recognition is of major importance not only regarding the entity and clinical severity but also regarding the incidence in the population of the country and the possibility of its prevention (3). The primary hotspot of the infection is represented in the half of the cases with spondilodiscitis. Their identification along with the predisposing factors is very important regarding the etiology, pathogenesis, epidemiology, clinical manifestations, and treatment of IR (2,3). There are no analytical studies on IR even though some data exist on these microbial pathologies from some small scale studies. The study aim is to give an overview of epidemiological and etiological aspects of infectious Rachiditis among adults in our country.

Methods

The study included 93 cases with IR identified during the period 2006-2016 at Infectious Diseases Hospital at University Hospital Centre "Mother Teresa" in Tirana. IR diagnosis was based on the imaging data of the Rachiditis from CT and MRI examinations. Data regarding the clinical-biological manifestations for all cases were collected from

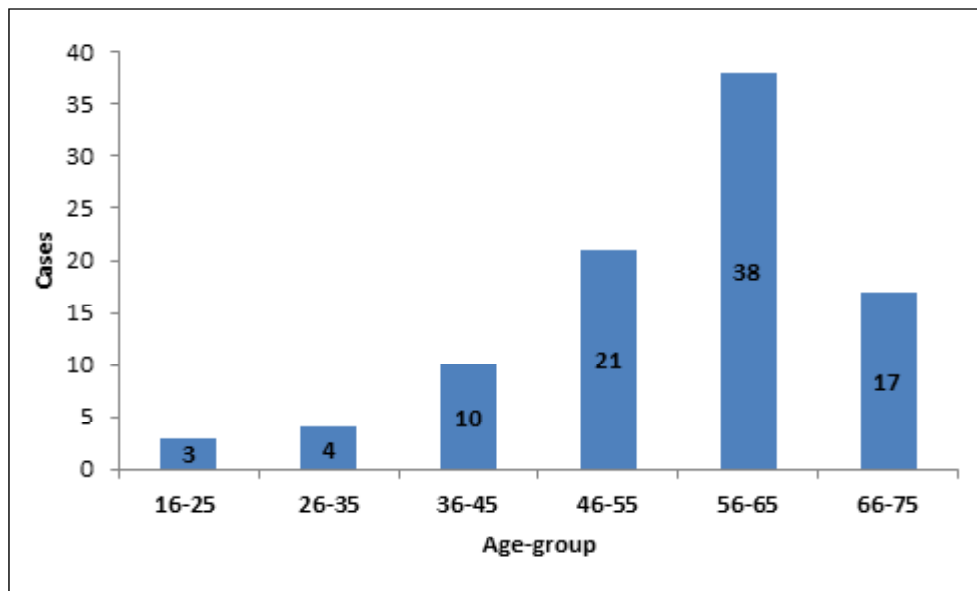
patients' medical files as well as laboratory tests regarding microbiological research and/or the presence of primary hotspots with no identification of microbial agent in blood cultures, but with positive therapeutic test. To assess the epidemiological aspects we sorted the cases by year and grouped them according to gender, age, occupation, place of residence. In any case, we searched for predisposing factors based upon the definition of community and nosocomial infection and evaluated the immune status of the subject. The microbiological research comprised: repeated Blood cultures, the culture of material obtained through the biopsy; serological tests for brucellosis (Wright, ELISA), Echinococcus Enzyme Linked Immuno Assay (ELISA), *S. typhi* (Vidal) and direct microscopy. We grouped IR by infectious agents to present the etiological spectrum and the specific weight of each cause of Rachiditis. We analyzed also the association between primary focus and microbial cause of RI. Patients in whom other external non microbial factors were present irrespectively of the fact of presence of suggestive lesions for infectious Rachiditis were excluded from the study.

Data was analyzed with the SPSS 20 software. The chi-square test was used for the comparison of proportions between categories of variables. A p-value ≤ 0.05 was considered statistically significant.

Results

Mean age of patients was 54.4 ± 7.7 years, with a range from 16 to 75 years. Sixty (64.5%) of the patients were males and 33 (35.5%) were females (the ratio males/females was 1.8/1).

The majority of cases, 38 (41%), belong to age group 56-65 years with a significant difference with other age groups ($p < 0.01$). In total, 17 (18.3%) of cases are ≤ 45 years whereas 76 (81.7%) cases are ≥ 46 years (ratio 1:4.5) (Figure 1).

Figure 1. Distribution of cases by age group

The distribution of cases by time of occurrence presents a significant upward trend from the year 2000 to 2016. Five (5.4%) cases were identified over the period 2000-2005, 37 (39.8%) cases between 2006-2010 and 51 (54.8%) cases between 2011-2016 ($p < 0.01$). 52 (56%) out of 93 cases

manifested immunodepression (95%CI 45.3 – 66.2). 5 (3.8%) out of 52 cases were identified over the period 2000-2005, 18 (34.6%) cases between 2006-2010 and 32 (61.5%) cases between 2011-2016 ($p < 0.01$) representing a significant upward trend too ($p < 0.01$) (Table 1).

Table 1. Distribution of total cases of IR and immunodepressed cases by time period

	2000-2005	2006-2010	2011-2016
IR, total (n=93)	5	37	51
Immunodepressed (n=52)	2	18	32

According to place of residence IR cases were identified all over the country regions while the majority of IR patients, 38 (41%) live in Tirana ($p < 0.01$). The frequency of cases in other regions ranged from 1 to 5 cases. Farmers (35.5%) and

retired individuals (24.7%) were the most affected from IR.

The primary focus of infection was detected in 23 (24.7%) cases. The location of infection is presented in the Table 2.

Table 2. Location of infection among IR cases (N=23)

Location	N	%
Genitourinary tract	3	13.0
Skin and soft tissues	2	8.7
Intravascular bypasses	1	4.3
Gastrointestinal tract		
acute cholecystitis	1	4.3
small intestine	1	4.3
Respiratory tract		
pulmonary <i>Echinococcus</i>	1	4.3
massive pneumonia dexter	2	8.7
pulmonary TB	2	8.7
Oral cavity		
dental abscesses	1	4.3
apical granuloma	1	4.3
Spinal cord		0.0
herniated disc	1	4.3
vertebral plastic	1	4.3
Invasive diagnostic procedures		
colonoscopy	1	4.3
lumbar puncture	1	4.3
epidural anesthesia	1	4.3

Predisposing conditions were encountered in 58 years being the most frequent condition (53.4%) (62.4%) patients among which the age over 60 (Table 3).

Table 3. Distribution of predisposing conditions (N=58)

Predisposing conditions	N	%
Age >60 years	31	53.4
Diabetes mellitus	11	19.0
Iv drug use	1	1.7
Corticotherapy	2	3.4
Rheumatic disease		
osteoporosis	3	5.2
rheumatoid arthritis	1	1.7
ankylosing spondylitis	1	1.7
Tumoral diseases (chemotherapy)	2	3.4
Chronic renal failure	1	1.7
Hepatic cirrhosis	1	1.7
Abdominal surgery	2	3.4
Thoracic surgery	1	1.7
Severe chronic alcoholism	1	1.7

During the study period 12 (13%) out of 93 cases were classified as nosocomial IR, thus, contracting the disease while being admitted in hospital. Four (33.3%) out of 12 cases underwent invasive procedures onto the vertebral column, 1 (8.3%) case spinal anesthesia for Caesarean section, 3 (25%) cases spinal surgery (herniated disc 1 case, vertebral-plastic 1 case, spinal *Echinococcus* 1 case), 1 (8.3%) case abdominal surgery for cholecystectomy, 1 (8.3%) case vascular surgery for prostheses of the abdominal aorta and aortic dissection); 1(8.3%) case thoracic surgery for pulmo-

nary *Echinococcus* and in 1 (8.3%) case a urinary catheter was placed.

The median time interval between event and clinical onset of nosocomial Rachiditis was 3.5 weeks with an interquartile range from 1.7 to 8.5 weeks.

The patient who underwent vertebral plastic developed IR after 1 week of admission while the patient who had spinal surgery for *Echinococcus* developed IR after 8.5 weeks of admission.

Regarding the etiological data, microbial agents were identified in 71 (76.3%) of cases (Table 4).

Table 4. Microbial agents identified (N=71)

Microbial agents	N	%
<i>Brucella melitensis</i>	32	45.1
<i>Staphylococcus aureus</i>	14	19.7
<i>Streptococcus</i> spp.	3	4.2
<i>Mycobacterium tuberculosis</i>	9	12.7
<i>Brucella melitensis</i>	1	1.4
<i>Salmonella typhi</i>	1	1.4
<i>Escherichia coli</i>	2	2.8
<i>Pseudomonas aeruginosa</i>	1	1.4
<i>Roseomonas Gilardii</i>	1	1.4
<i>Eikenella corrodens</i>	1	1.4
<i>Sphingomonas</i> spp	1	1.4
<i>Flavobacterium</i>	1	1.4
<i>Aspergillus</i> spp.	1	1.4
<i>S. aureus</i> + <i>Enterococcus</i> spp.	1	1.4
<i>B. melitensis</i> + <i>S. aureus</i>	1	1.4
<i>P. aeruginosa</i> + <i>M. tuberculosis</i>	1	1.4

Discussion

This is the first study that presents data regarding IR in the medical literature of our country and for this reason it represents not only theoretical, but also a great practical importance.

Data show that the number of IR cases is increasing significantly over the years. This epidemiological phenomenon we think is related to several factors such as advanced imaging diagnosis, new diagnosing methods and their rational implementation in clinical practice, a better triage and management of IR cases

at our service and a deeper understanding of this syndrome by clinicians. Also, there is an increasing awareness among the general practitioners, patients and their family members regarding this pathology, a qualitative and continuous collaboration between various branches of medicine such as neuroscience imaging service, rheumatology, orthopedics and infectious diseases specialists and no doubt the real increasing number of the cases due to increasing of average age of our population, increasing likelihood for occurrence of nosocomial IR and intravenous

drug use, subject discussed also in the literature (4,5).

In our study IR was most common in men, approximately in the ratio 2:1 to females. We would explain this gender difference, which is also described in the literature (6-8) with more difficult professions predisposing for damage and the IR manifestation which are attributed to males rather than females.

Regarding the affected age groups it turned out that the vast majority of patients in our study belonged to age group 56-65 years but also the ratio of cases ≤ 45 years to ≥ 46 years was 1:4.5. It is well known that IR disease is associated with older age and the fragility of locomotor system due to the degeneration processes over the years and also with lowering function of natural killer cells and T cells (9,10).

IR is present all over the country and affects subjects with different professions, findings reported also by various authors (11).

We note that the predisposing conditions were present in about half of study patients. This finding has implication indicating the application of new diagnostic algorithms as they can successfully applied also in new subjects and in cases without disorders of the immune system. The compromise of immune system was found in 56% of our patients. However, it should be recognized that there is a multitude of predisposing factors not only in their number, but also regarding their type and nature. So, we detected 58 different types of predisposing factors. The age group over 60 years is a significant factor which usually it is overlooked. We encountered this important epidemiological factor in the 33.3% of our cases and we emphasize that it can also be a sole factor, thus not associated with other co-factors predisposing to this infectious pathology. Very interesting it is also the nosologic spectrum of predisposing factors, which is highlighted from our study. It shows that IR can be found in subjects with systemic autoimmune rheumatic diseases; in subjects with malignancy and under chemotherapy; pathological cases with advanced organic decompensation,

subjects under dialysis etc. In such patients a careful and a deep differential diagnosis is required therefore manifestations and symptoms which are in fact linked to IR can be better treated and improve the quality of their lives. We have to pay much greater attention to these pathological patterns.

It is worth to discuss about some findings that should be taken into account when dealing with patients with diabetes mellitus or under corticotherapy or drugs users. Such cases today are on a continuous rise for well-known reasons. In our study such subjects constitute respectively 19%, 3.4% and 1.7% of the cases. Similar findings have also been reported in other countries (12,13).

With reference to the above relevant epidemiological data it is important to mention that in 13% of patients the IR was of nosocomial origin which is also reported by other authors (1,3,5,7-9,12). It is important to mention that the procedures in loco where not the only ones that influenced the manifestation of Rachiditis, but also those distant to the vertebral column, what we found in 50% of these nosocomial cases respectively. Regarding such possibilities also other authors (14,15).

One topic which we think is very important and it is highlighted in our study is the interval of time between the hospital admission and manifestation of RI. There is a scarce evidence in literature regarding this matter but we think that the recognition of this time indicator is very important and useful because it assists in establishing the association of the nosocomial event with the manifestation of Rachiditis, in terms of its early detection not only clinically but also in terms of its etiology. To our experience this interval resulted to be very flexible: from one to 8.5 weeks, linked with the surgery of spinal vertebroplastic and surgery for pulmonary echinococcus respectively. Furthermore, in terms of etiological perspective this study presents for the first time the results of laboratory investigation of this infectious syndrome.

The microbial etiology of Rachiditis has been detected in 76.3% of the total cases by several

methods of examination. In 22 (23.7%) of the cases, the microbial agent could not be discovered.

We can note that detecting the microbial cause of IR is a difficult process which requires the implementation of some complicated diagnostic procedures and an appropriate laboratory infrastructure. Most importantly, we point out that IR in Albania is caused not only by tuberculosis or brucellosis and staphylococcus, which are regarded as traditional strains (16-19), but also from other newly emergent microorganisms such as *R. gilardii*, *E. corrodens*, *Sphingomonas spp*, *Flavobacterium* and by a set of microbial communities.

Different authors (20,21) have highlighted the role of micro-organisms related to IR. Also, it is worth mentioning the identification of *Aspergillus* and *Echinococcus* as the cause of the syndrome, which implies the implementation of therapeutic protocols,

which in these cases should be very specific (22). Since the cause could not be discovered in 23.7% of cases, more research and different approaches should be explored to establish the etiological diagnosis for Rachiditis. Diagnostic and clinical-biological imaging criteria of the syndrome are not sufficient for the successful management of the syndrome. Nowadays, the identification of the cause is a very important issue because it is subsequently followed by the administration of an effective treatment of the IR. This may take a long time to overcome hindrances and difficulties.

We can conclude that, nowadays, we have advanced capacities for the diagnosis and management of IR, but our goal is to improve further the laboratory infrastructure, therapeutic protocols and a constant and long term follow-up of such cases.

Conflicts of interest: None declared.

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