Pott's disease in the province of Chaco

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Abstract

Introduction: Tuberculosis is the seventh cause of death worldwide. Less than 1% of the patients have spinal involvement. The aim of this study was to investigate the Pott's disease frequency in our province and to identify guidelines for similar regions.

Materials and Methods: Screening of patients admitted for tuberculosis between 1996 and 2014 in referral provincial hospitals. Review of spinal cases medical histories. Frankel and GATA Classifications. Data from National Censuses. Bibliographic review.

Results: Fourteen cases: 8 males/6 females. Average age: 35.4 (ranging from 3.8 to 63). Follow-up: 2.8 years (1 month-15 years). One immediately post-operative demise. Seven patients came from Departments with low TB morbidity burden. Initial symptoms: neurologic deficit (9 cases), pure axial or root pain (4 cases) and pure vertebral bone deformity (1 case). Frankel at admittance: E (5 cases), D (2), C (2), and A (5). Location: thoracic, 5; thoracic-lumbar, 6; lumbar, 1; multiple, 2 patients. Ethnic distribution: 5 Caucasian patients, 5 Native patients, 3 Creole patients, and 1 *Mestizo* patient. GATA Classification: 1 type IB lesion; 4 type II lesions; 8 type III lesions, and one unclassifiable lesion. Native patients showed more serious neurologic signs and symptoms, and GATA lesions. Twelve patients were operated on, 5 showed sequela deformity with no differences between double instrumentation, isolated posterior instrumentation and no instrumentation at all. At follow-up: 8 asymptomatic patients, 4 deceased patients, and 2 patients with moderate symptoms; there was no neurologic deterioration with just 5 improvements.

Conclusions: In Native patients severe forms, advanced presentations and surgical indications are more frequent. Mortality rates are high.

Key words: Tuberculosis; Pott's disease.
Level of evidence: IV

Mal de Pott en la provincia del Chaco

Resumen

Introducción: La tuberculosis es la séptima causa de muerte mundial. Menos del 1% de los pacientes tiene compromiso raquídeo. El objetivo del estudio fue investigar la frecuencia del mal de Pott en la provincia e identificar pautas para regiones similares.

Materiales y Métodos: Rastreo de pacientes internados por tuberculosis entre 1996 y 2014, en Hospitales provinciales de cabecera. Revisión de historias de casos raquídeos. Clasificaciones de Frankel y del GATA. Datos de censos nacionales. Revisión bibliográfica.

Conflict of interests: The authors have reported none.

Resultados: Catorce casos: 8 varones/6 mujeres. Edad promedio: 35.4 años (rango 3.8-63). Seguimiento: 2.8 años (1 mes-15 años); un óbito posoperatorio inmediato. Siete pacientes provenían de Departamentos con baja carga de morbilidad de tuberculosis. Síntomas iniciales: déficit neurológico (9 casos), dolor axial o radicular puro (4 casos) y deformidad vertebral pura (1 caso). Frankel al ingreso: E (5 casos), D (2), C (2) y A (5). Localizaciones: torácica, 5; toracolumbar, 6; lumbar, 1; múltiple 2 pacientes. Distribución étnica: 5 caucásicos, 5 aborígenes, 3 criollos, 1 mestizo. Según la Clasificación del GATA: 1 lesión de tipo IB; 4 de tipo II; 8 de tipo III; 1 caso inclasificable. Los pacientes de etnia originaria tuvieron cuadros neurológicos y lesiones GATA más graves. Doce fueron operados; 5 presentaron deformidad secuelar, sin diferencias entre doble instrumentación, instrumentación posterior aislada o sin instrumentación. Al seguimiento: 8 pacientes asintomáticos, 4 fallecidos y 2 con síntomas moderados; no hubo deterioros neurológicos y solo 5 mejorías.
Conclusiones: En pacientes de etnia originaria son más frecuentes las formas graves, las presentaciones avanzadas y de tratamiento quirúrgico habitual. La mortalidad es alta.

Palabras clave: Tuberculosis; mal de Pott.
Nivel de Evidencia: IV

Introduction

Tuberculosis (TB) is such an issue that the World Health Organization has declared it a global emergency—it is still an endemic disease and represents the seventh cause of death worldwide.[1] Most cases estimated in 2012 occurred in Asia (58%) and Africa (27%); in the Americas, the proportion is much lower (3%).[2] In Argentina, it is still a significant issue in public health, causing more than 10,000 new diseases per year.[3]

The spine is involved in <1% of all the TB cases, but this involvement —Pott's disease— is one of the most dangerous possibilities due to the likely neurologic deficit and spinal deformity it is associated with.[4]

The aim of this work was investigate the frequency of Pott's disease in our province, to characterize its profile and to identify useful guidelines on diagnosis and treatment for similar regions in our country.

Materials and Methods

We carried out a screening for all the patients admitted with TB at Chaco's referral hospitals during the period between 1996 and 2014 (19 years). We checked medical histories in those cases which showed spinal signs and symptoms, and registered the available cadastral data. We used the Frankel Classification[5] for neurologic lesions and the GATA[6] Classification to typify vertebral injury. The medical-radiographic results in every patient operated on were assessed on an *ad hoc* grid, and we classified them as: good, regular, and poor results (Table 1).

We used the official demographic data supplied by the 2001 and 2007 National Censuses,[7-9] and matched such information against the data collected in all the patients that we assessed. We carried out a bibliographic review.

Results

Throughout this period of time we assessed 16 cases out of which two were undergoing a quiescent affection (according to the Medical Research Council Classification[2], sequela infection or Pott's deformity[11]); so, they were not considered in this piece of reserch. Consequently, the study is based on the remaining 14 cases: 8 males/6 females (Table 2). On average, at the time of the diagnosis they were 35 years, 5 months old (ranging from 3 years, 10 months and 63 years old); three patients were <18 years old at the time of diagnosis (1:3.7 children: adult ratio). Yearly distribution of the cases was homogeneous. The average follow-up was 2 years and 10 months (ranging from 1 month to 15 years) in 13 patients, since we registered a patient's demise immediately after the surgery. The average patients' age at the time of follow-up was 37 years, 10 months (ranging from 5 years, 9 months and 64 years old).

In four patients, we ignored the Provincial Department they came from; the remaining 10 patients came from six different Departments; seven out of these 10 patients came from Departments with low TB morbidity burden.

Onset symptoms sometimes were unique, whereas, in other cases, they were associated with each other: neurologic deficit in nine patients (3 were associated with deformity and 3 were associated with pain), pure axial or root pain in 4 patients, and pure vertebral bone deformity

Table 1. Grid showing medical-radiographic results

Good results	Asymptomatic or minor symptoms + Complete neurologic recovery + No radiographic sequela or minimal sequela
Regular results	Minor symptoms + Partial neurologic recovery + Moderate radiographic sequela (kyphosis)
Poor results	Major symptoms or Lack of neurologic recovery or Major radiographic sequela or Demise

Table 2. Cases

Case	Sex	Ethnic group	Age	Symptom at admittance	Initial Frankel	GATA type	Vertebral foci	PPT	Approaches	Surgical techniques	Post-operative support	Follow-up	Follow-up Frankel	Follow-up symptoms
1	M	Caucasian	50	Low back pain with right femoral nerve pain	D	II	L1-L2	Yes	Posterior approach	Decompression + Instrumented posterior arthrodesis	2 months	1 year	E	Asymptomatic
2	F	Caucasian	37.8	Low back pain + Root pain	E	II	T12-L1	Yes	Anterior approach	Drainage by thoraco-phreno-laparotomy	3 months	15 years	E	Asymptomatic
3	F	Creole	38.1	Sever disabling low back pain	E	II	T12-L1	Yes	Anterior approach	Corpectomy + Three-cortical bone graft	3 months	7 years	E	Very symptomatic
4	F	Caucasian	37	Paraparesis + High back pain	C	III	T6-T7	Yes	Consecutive double approach	Corpectomy + Drainage + Reconstruction + Anterior instrumentation + Instrumented posterior arthrodesis	No	3 years and a half	E	Asymptomatic
5	M	Mestizo	10	Paraplegia + Pott kyphosis	A	III	Multiple foci		Anterior approach	Corpectomy + *Toilette* + Reconstruction + Anterior instrumentation	No	2 years	A	
6	M	Native	3.8	Vertebral defomity	E	III	T9-T10-T11	Yes	One-stage double approach	Corpectomy + Reconstruction + Anterior instrumentation + Posterior instrumentation	12 months	1 year	E	Asymptomatic
7	M	Caucasian	17	Low back pain	D	III	L1-L2	Yes	Delayed double approach	Corpectomy + Reconstruction + Anterior instrumentation + Posterior instrumentation	No	2 years	E	Asymptomatic
8	F	Native	41	Parplegia + Kyphosis	A	III	T7-T8-T9	Yes		Refusal to the surgery	No	6 months	A	
9	M	Creole	20	High-low back pain	E	IB	T11-T12	Yes	Posterior-lateral approach	Drainage + Arthrodesis with rib graft	3 months	2 years	E	Asymptomatic
10	M	Caucasian	58	Low back pain	E	II	L3-L4	Yes	Posterior approach	Pedicle emptyning + Posterior instrumentation	3 months	1 year	E	Asymptomatic
11	M	Creole	63	Paraplegia + Kyphosis	A	III	T5-T6-T7	Yes	Two surgeries: Thoracoscopic surgery assisted by video Afterwards, posterior-lateral approach	Thoracoscopic surgery assisted by video: Decompression + fibula graft Costotransversectomy: Drainage + Graft re-positioning	No	1 year	B	Asymptomatic
12	M	Native	47	Paraplegia	A	III	L1-L2	No	Consecutive double approach	Anterior decompression Decompression, drainage and posterior instrumentation	No	Post-operative demise	A	Demise by post-operative multiorgan faiure
13	F	Native	50	Paraparesis	C	III	T6-T7	Yes	Posterior-lateral approach	Corpectomy+ Rib graft	2 months	1 year	D	Asymptomatic
14	F	Native	23	Dysbasia	A	un-classifiable	CTLS spread multiple foci	No		Drainage of psoas abscess by US-guided puncture aspiration	No	1 month	A	Demise by multiorgan failure

CTLS = cervical, thoracic, lumbar and sacral

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in one of them. Thus, 64.3% (9/14) of the patients showed neurologic deficit; in five cases, it was complete (Frankel A) (Table 2).

The ethnic distribution of the patients was as follows: five Caucasian patients, five Native patients, three Creole patients and one *Mestizo* patient (Native-Creole).[12] Native patients showed more severe neurologic symptoms at onset (Table 3). Spinal localizations were as follows: Thoracic spine (5 patients), Thoracic-lumbar spine (6 patients), Lumbar spine (1 patient) and multiple spinal foci (2 patients) (Figure 1).

According to the GATA Classification,[6] one lesion was type IB, four were type II, eight were type III, and there was an unclassifiable case (Figure 1). Native patients also had always more severe lesions and, predictably enough, patients with more serious spinal lesions suffered signifi-

Table 3. Ethnic group vs. Initial neurologic status

		Initial Frankel				
		A	B	C	D	E
Ethnic group	Native	3		1		1
	Caucasian			1	2	2
	Creole	1				2
	Mestizo	1				

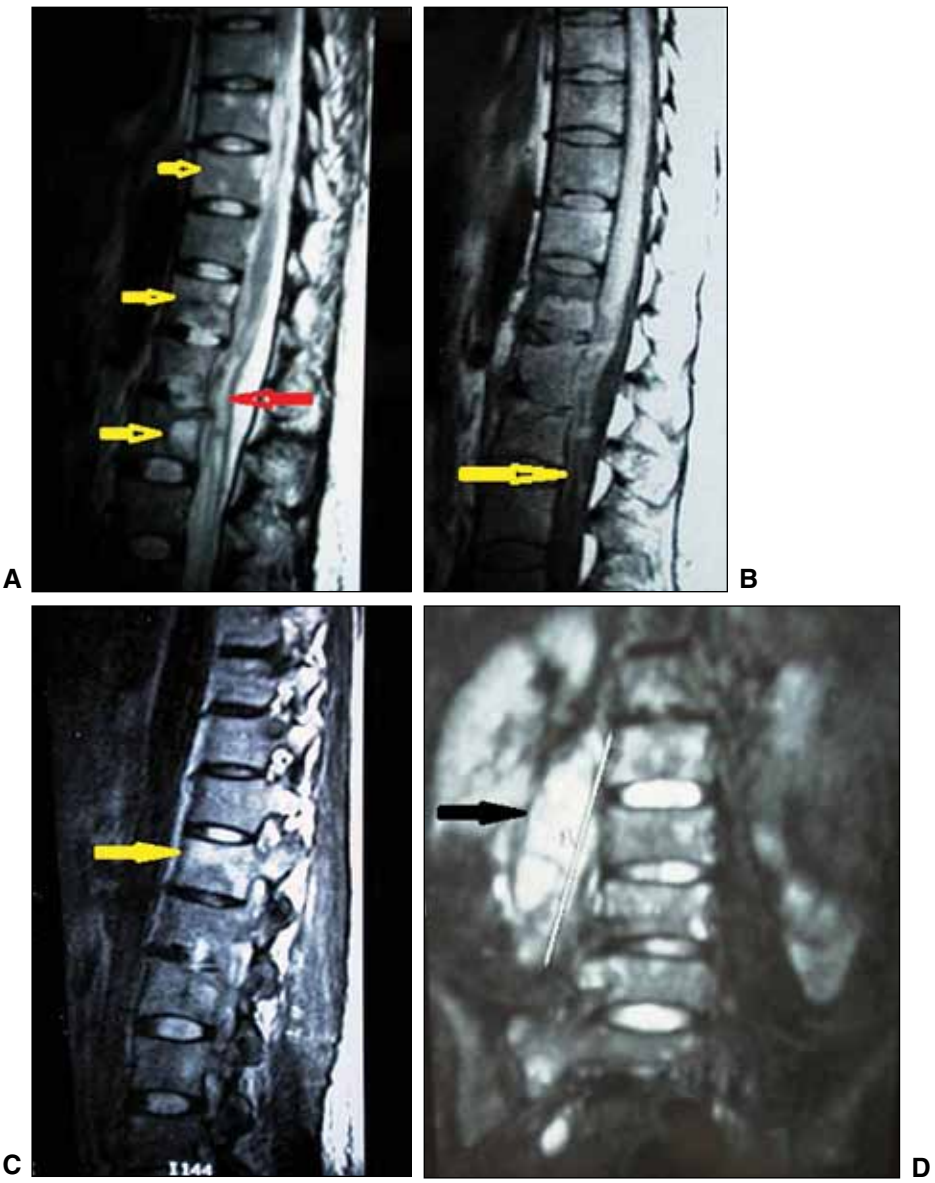

Figure 1. Case # 14's MRI. Twenty-three year-old female patient, qom ethnic group, Frankel A at admittance, with multiple vertebral foci at different levels (**A**), epidural and intra-dural spread (**A** y **B**), anterior and posterior involvement in some vertebral bones (**C**), para-vertebral abscesses (**D**) and meningo-encephalitis. GATA: unclassifiable. Demise one month after admittance.

cant neurologic damage more often: seven out of the nine patients with initial neurologic deficit were GATA type III (Table 4).

Twelve out of the 14 patients carried out complete pharmacological treatment; two patients did not, due to early demise. Twelve patients were operated on; two of them refused surgery. In these 12 patients, we carried out 17 approaches (one patient underwent a second surgery): six posterior approaches, seven anterior approaches, three costo-transversectomies and one thoracoscopic surgery assisted by video. There were 10 instrumentations (6 posterior ones, 4 anterior ones) which, needless to say,

Table 4. Initial Frankel vs. GATA Classification

		Initial Frankel				
		A	B	C	D	E
GATA Classification	IA					
	IB					1
	II				1	3
	III	4		2	1	1
	Unclassifiable	1				

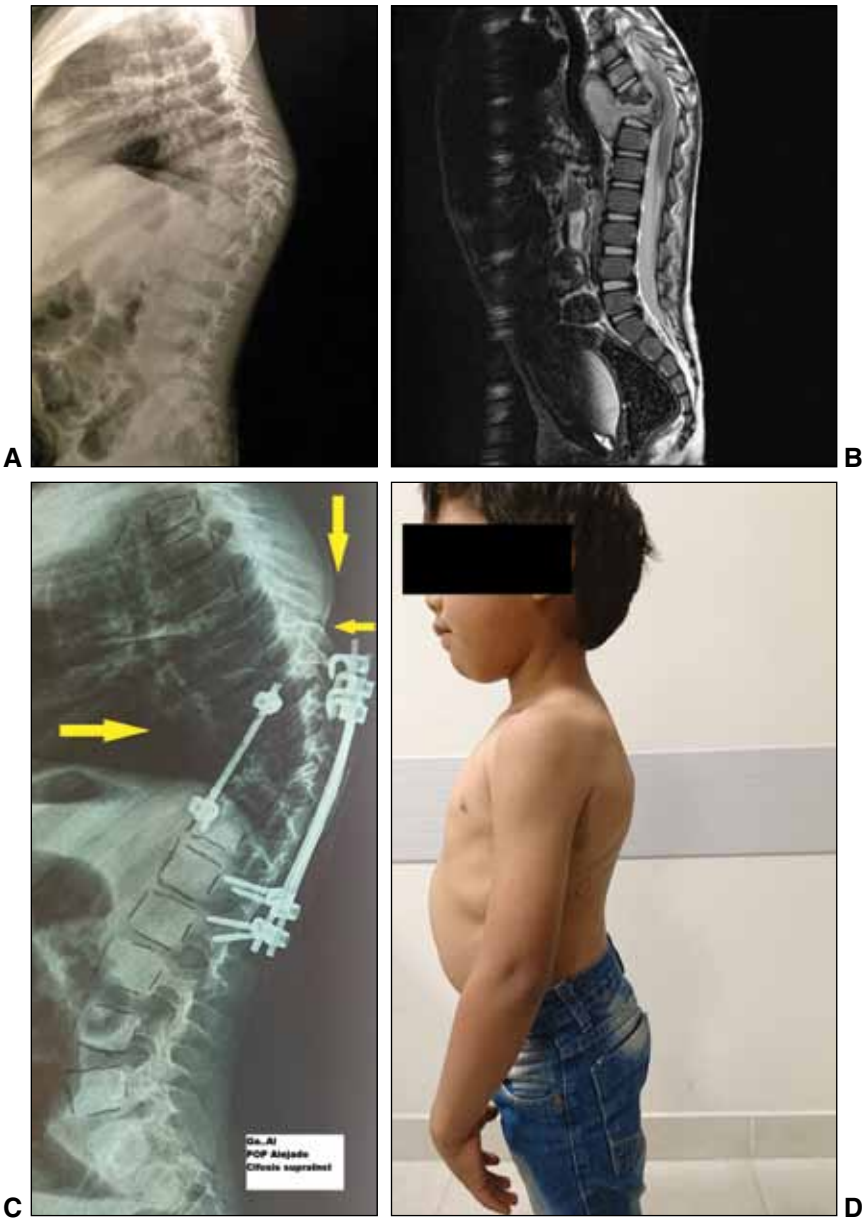

Figure 2. Case # 6. Three years, 10 month old male patient, qom ethnic group, Frankel E, GATA III with neuro-aggressive kyphosis at admittance (**A** and **B**). Operated on by double approach, drainage, curettage, sequestrum removal, anterior reconstruction and double instrumentation. The patient suffers supra-instrumentation kyphosis in the remote post-operative follow-up (at post-operative 2 years, 10 months) (**C**) with no major medical deterioration, though (**D**).

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prevailed in GATA type III. Seven out of the 12 patients operated on received post-operative support, all of them with bi-valve plaster corset, but for one pediatric patient who used a thermoplastic TLSO (thoracic-lumbar sacral orthosis) for a year (Figure 2); support was kept 4 months and a half on average (ranging from 2 to 12 months).

Three patients died during follow-up (one of them immediately after the surgery); in two of these cases the Provincial Department they came from was known, and they were not among the ones associated with the highest TB mortality rates. A fourth patient died after her last check-up (carried out 7 years after the surgery) due to causes independent of the disease (Case # 3: uterus cervix cancer, hyperthyroidism and chronic renal failure [Table 2]).

During follow-up, eight patients were asymptomatic, four patients had died and two patients showed mild symptoms (one high back pain, one low back pain). It is worth highlighting that five of the GATA type III patients were asymptomatic. In five patients, the pre-operative status improved; eight remained the same, and one died immediately after the surgery (Table 5). However, five out of the 11 patients operated on who survived showed kyphosis deformity as sequela; two suffered severe deformities, one of them associated with scoliosis. There were not differences among the patients with double instrumentation, isolated posterior instrumentation and no instrumentation at all; however, a very little growing child with double instrumentation showed kyphosis above the area of instrumentation (Table 6). Only half the patients operated on had medical-radiographic results that can be considered as good (Table 7).

Discussion

TB remains as an international public health issue. Nowadays, it is believed that worldwide one third of the population suffers TB.[13] Yearly incidence is slightly greater than 8 millions, with mortality rates of 3 million per year.[13] In the Americas, the World Health Organization in 2012 detected a prevalence rate of 40 cases per 100,000 inhabitants and an average incidence rate of 29 new cases/year/100,000 inhabitants.[2]

The average age at the time of diagnosis among our patients was 35.4 years old, but three of them were <18 years old. This age average in the series is slightly greater than the age that has been mostly affected in our country over the past few years,[14] although it is quite lower than that in another national series.[15] The presence of TB in <15 year-old children (and what is more, in <5 year-old children)

Table 5. Initial Frankel vs. Follow-up Frankel

		Follow-up Neurologic Status					
		Demises	Frankel A	Frankel B	Frankel C	Frankel D	Frankel E
Admittance Neurologic Status	Frankel A	1	3	1			
	Frankel B						
	Frankel C					1	1
	Frankel D						2
	Frankel E						5

Table 6. Instrumentation vs. Sequela*

	Severe kyphosis	Mild-to-moderate kyphosis	None
Isolated anterior instrumentation	1		
Isolated posterior instrumentation			2
Anterior and posterior instrumentation		1**	2
No instrumentation	1	2	2

*In 11 patients operated on who survived (12 patients operated on with an immediately post-operative demise).
** <6 year-old growing child with supra-instrumentation kyphosis

Table 7. Medical-radiographic results

Good results	6 patients
Regular results	2 patients
Poor results	4 patients

reflects the presence of current infection sources: two of our patients were <15 years old (one belonged to the qom ethnic group, whereas the other one was a *Mestizo* patient). The onset of pediatric TB in general suggests the presence of an undetected infection source, with no treatment or with incomplete treatment.[16] The problem of the worldwide under-diagnosis of TB in the pediatric population is illustrated by the low number of reported cases in four countries with a high TB burden where we could expect rates greater than all-the-cases-10%: Russia (0.8%), India (1.1%), Nigeria (1.4%), and Brazil (3.5%).[4] In our country, it has been proved time and time again that the condition is under-notified and it has unequal distribution among districts.[17] Ten percent of the children who make contact with an adult that suffers TB can develop active TB.[18] In populations with great numbers of smear-positive patients, the highest rates of incidence are seen in small children and young adults, with bi-modal profile.[19] Thus, although it is acknowledged that the Pott's disease prevalence increases proportionately to the patients' age,[20] that the children: adult ratio in this series is much greater than this ratio usually is in our hospitals (1:3.7) comes as a surprise.

In most Latin American studies the association between male sex and extra-pulmonary TB —including the Pott's disease—is homogeneous.[21] However, in this series of spinal extra-pulmonary foci, it is slightly higher in the male sex (14 cases: 8 males/6 females) and, in some national series specifically focused on the Pott's disease, the one which prevails is the female sex.[22]

With respect to the ethnic origin of the patients, it is striking that five out of the 14 cases were Natives (35.7%), when only 3.9% of the province inhabitants are so.[23] Although in North America they acknowledge the greater prevalence of Natives,[24] we have found neither in National nor in Latin American literature any analysis of TB frequency in relationship with the ethnic origin. We believe it relevant that if we match systematically the ethnic origin of our patients against the initial Frankel and the GATA Classification, the Native patients always had serious anatomic and neurologic lesions (Tables 3 and 8).

Strikingly enough, only three out of the 10 patients we had registered where they came from belonged to the two Departments with the highest rates of TB case notification in the province.[14]

Accurate diagnosis identifying the *Mycobacterium* is not always possible in the spine: even in referential centers, micro-organism recovery might reach just 67%.[25] Many authors suggest starting treatment for tuberculosis in the presence of the typical medical-radiographic evidence in patients that come from areas of high prevalence.[26] Many times what is problematic is differential diagnosis with pyogenic spondylo-discitis, although it is acknowledged that we can get quite an accurate diagnosis by associating medical findings with lab results.[15,27] On the other hand, as in other national series,[15] in four of our patients (Table 2: Cases #3, #5, #6 and #14) in spite of serious and multiple lesions and abscesses with great sample-taking, we were not able to get germs and the diagnosis was histological.

TB spondylitis involves the disc only at very late stages.[28] The sub-ligament spread of the infection can involve multiple vertebral bodies, either continuous or discontinuously (Figure 3).[28,29] Several of our patients (4/14) had more than two vertebral bodies involved, what seems to be hardly infrequent in our country, at least in children:[22] the two <15 year-old patients had multiple vertebral foci (Figures 2 and 3). MRI shows consistently vertebral involvement, edema in the bone marrow, preservation of the disc space up to the final stages, sub-ligament spread of the abscesses with walled para-vertebral abscesses, epidural spread, erosion of the vertebral plaques and discitis in 83% of the cases.[30] The neurologic deficit is greater in the pediatric population.[31]

There have been diverse attempts to classify spinal involvement in TB with therapeutic purposes.[32,33] In this series we used the GATA Classification[6] to determine the severity of spinal involvement, because we consider it useful to define the most appropriate type of treatment.

Table 8. Ethnic group vs. GATA Classification

		Ethnic group			
		Native	Caucasian	Creole	*Mestizo*
GATA Classification	IA				
	IB			1	
	II		3	1	
	III	4	2	1	1
	Unclassifiable	1			

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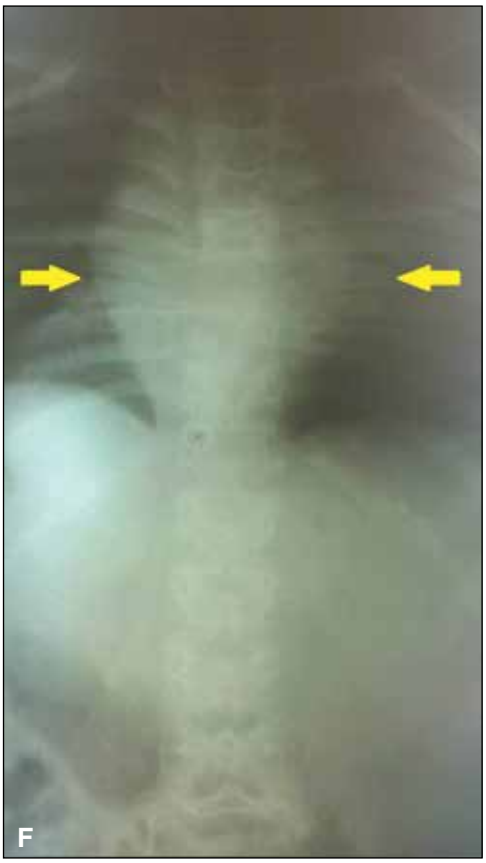
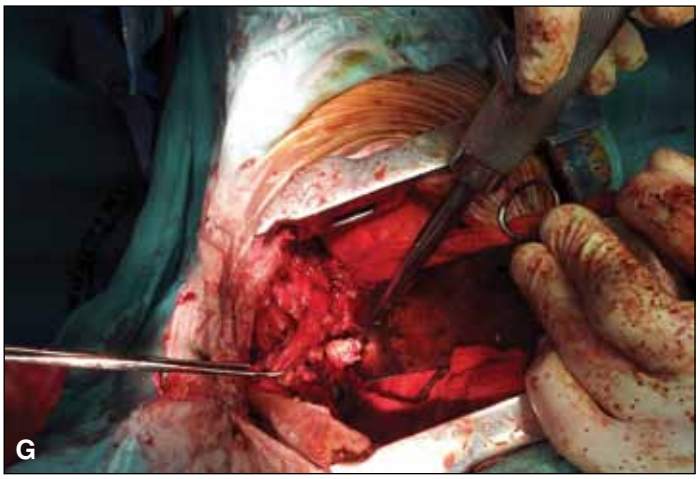
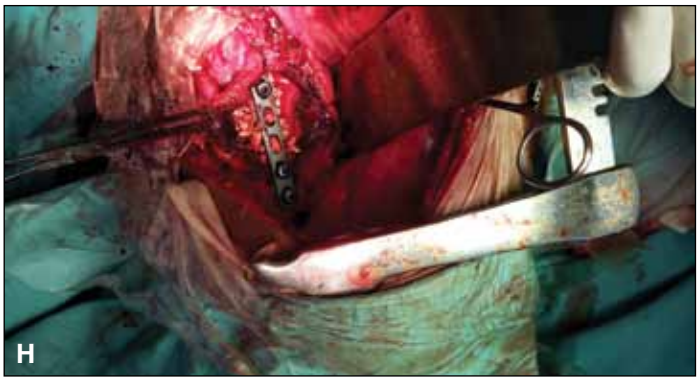
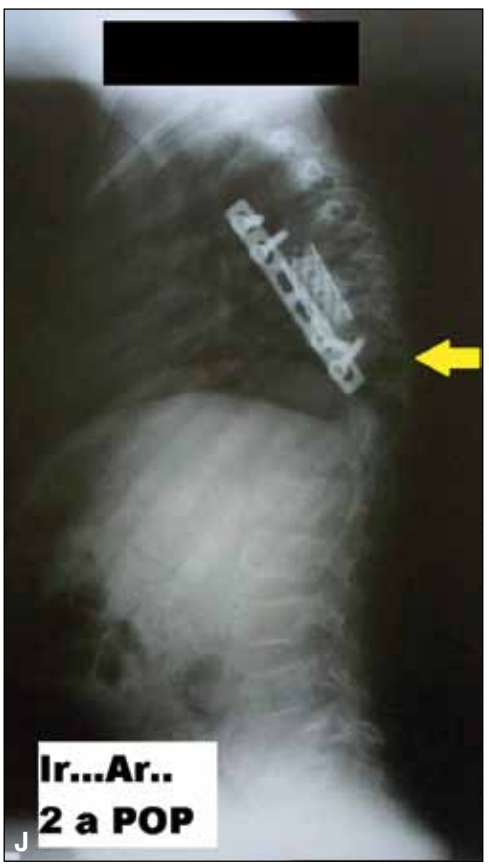
Figure 3. Case # 5. Ten-year old *Mestizo* male patient, Frankel A, GATA III in its main spinal location (**A**), although with multiple spinal and pelvic foci (**A-C**). At admittance, the patient showed a typical Pott kyphosis (**D and E**) due to the simultaneous destruction of a gross para-vertebral abscess (**F**) which was drained by anterior approach (**G**) associated with reconstruction and osteosynthesis by identical approach (**H and I**). However, there is significant kyphosis sequela (**J**).









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However, it is not extensive either, since it does not contemplate the cases of isolated posterior involvement[34] and, on the other hand, not all the cases can be included in its categories. Thus, one of our patients (Table 2: Case # 14) with epidural and intra-dural widespread spinal involvement could not be classified. In any case, in this work the GATA Classification was useful to reveal that Native patients suffered more severe lesions and to confirm that such injuries were associated with deeper neurologic disorders (Tables 4 and 8). Moreover, it suggests that the most serious lesions (type III) show more frequently that they should be subject to surgical treatment with double approach and double instrumentation (Figure 2).

The spread of the disease to the para-vertebral or the epidural spaces is frequent,[29] but the dural-intradural spread is rarer. It was described by Michod in 1871, and it can occur whether or not the process originates in the bone[35] (as in our Case # 14). It is usually scaring:[36] it is characterized by a granulomatous reaction in the subarachnoid space and, since the Central Nervous System is considered a "unique therapeutic compartment", in this entity[37] the association with encephalitis is not infrequent. It is acknowledged as the most destructive presentation of TB associated with considerable morbi-mortality,[38] that is unresponsive even to intensive pharmacological treatment:[39] our one case showed meningo-encephalitis and went to early demise; the case could not be classified with the GATA system, and it was the case of a Native (qom) (Figure 1).

Undoubtedly, the prognosis of the Pott's disease is determined by early diagnosis and the timely administration of an adequate treatment. Traditionally, it has been acknowledged that the treatment of choice is outpatient pharmacological treatment against TB.[10,35] Even a conservative approach consisting just of pharmacological treatment during an appropriate period of time seems to be effective for spinal deformity.[26] Surgery should be contemplated for biopsy in the cases of undiagnosed disease, for abscesses drainage, for fistulas treatment or the debridement of disc or bony sequestrum, for myelopathy management by spine decompression, or for spine stabilization and for prevention or correction of significant or progressive deformity. [6,22,35,40-42] Some minimally-invasive and percutaneous techniques also seem to find indication sometime;[42] in this series, one patient was approached by thoracoscopic surgery assisted by video, but with bad results due to the un-framing of the bone graft, what required a second surgery (Table 2: Case # 11).

Drainages and debridement improve and potentiate the pharmacological treatment, whereas biopsy-taking allows doctors to confirm the anatomic diagnosis, and spinal decompression can improve the neurologic prognosis.[6]

A radical surgery for resection and stabilization, at long-term gets lesser deformity as compared with isolated debridement.[10] However, there is no agreement on the angle of the deformity as of which kyphosis should be corrected—the tendency is to determine it around 25-30°.[40,43,44] Although there seems not to be differences in kyphosis progression between surgery and conservative treatment,[45] the surgery in the case of stabilization and correction of the deformity can bring about faster recovery and early mobilization.[6] The improvement in kyphosis is marginal with surgery, but a surgical approach can certainly prevent kyphosis from progressing.[31]

Patients who are <15 years old and with important kyphosis (>30°) show the worst progression prognosis;[45] our Case # 6 (3.8 years old) developed kyphosis, but above instrumentation and rather associated with the patient's potential remaining growth.

Neither is there agreement on the best surgical approach being anterior, posterior or anterior-posterior,[6,46-48] although potentially, kyphosis correction and prevention from progression may be better when anterior instrumentation is added.[48] In this respect, we cannot drew valid conclusions in this series (Table 6). According to the specialized bibliography, the double approach is also associated with better neurologic progression:[40] although here there was no neurologic deterioration, neither can we drew relevant conclusions with respect to such improvement (Table 9). Generally speaking, in this series patients operated on using a double approach (with or without double instrumentation) and those operated on only by posterior approach showed a tendency to better medical-radiographic results than those operated on just by anterior or posterior-lateral approach, especially in the most severe GATA types of the lesion (Figures 2-4).

Finally, in surgical treatment the loss of correction and the recurrence of the deformity is widely acknowledged, either by the bone graft swinging [Table 2: Case # 5 (10 years old) and # 11 (63 years old)] or by its partial reabsorption in anterior approaches[22], either by the posterior instrumentations un-framing or by their lack of anterior support.[40]

Mortality rates in this series were high: four out of the 14 patients died, although one of the deaths was not directly related to the disease. This is associated with the fact that the province has high mortality rates (the second or third one in the country, depending on the indicators used),[49,50] but in this series the demises did not occur in the highest mortality Departments.[49]

Since TB is a chronic condition usually seen in social classes with low economic and cultural resources, [14,24,51,52] it is essential to act in sanitary prevention, in the treatment of the family group and, needless to say, also to improve the population's economic status.[51,52] The control of TB transmission is the only effective way to avoid vertebral forms. For such control and, hopefully, for TB elimination, especially in Native communities, it is necessary to strengthen surveillance systems, to give information and access to health, and that all the involved groups coordinate their actions with the purpose of doing away with poverty and inequality.[52]

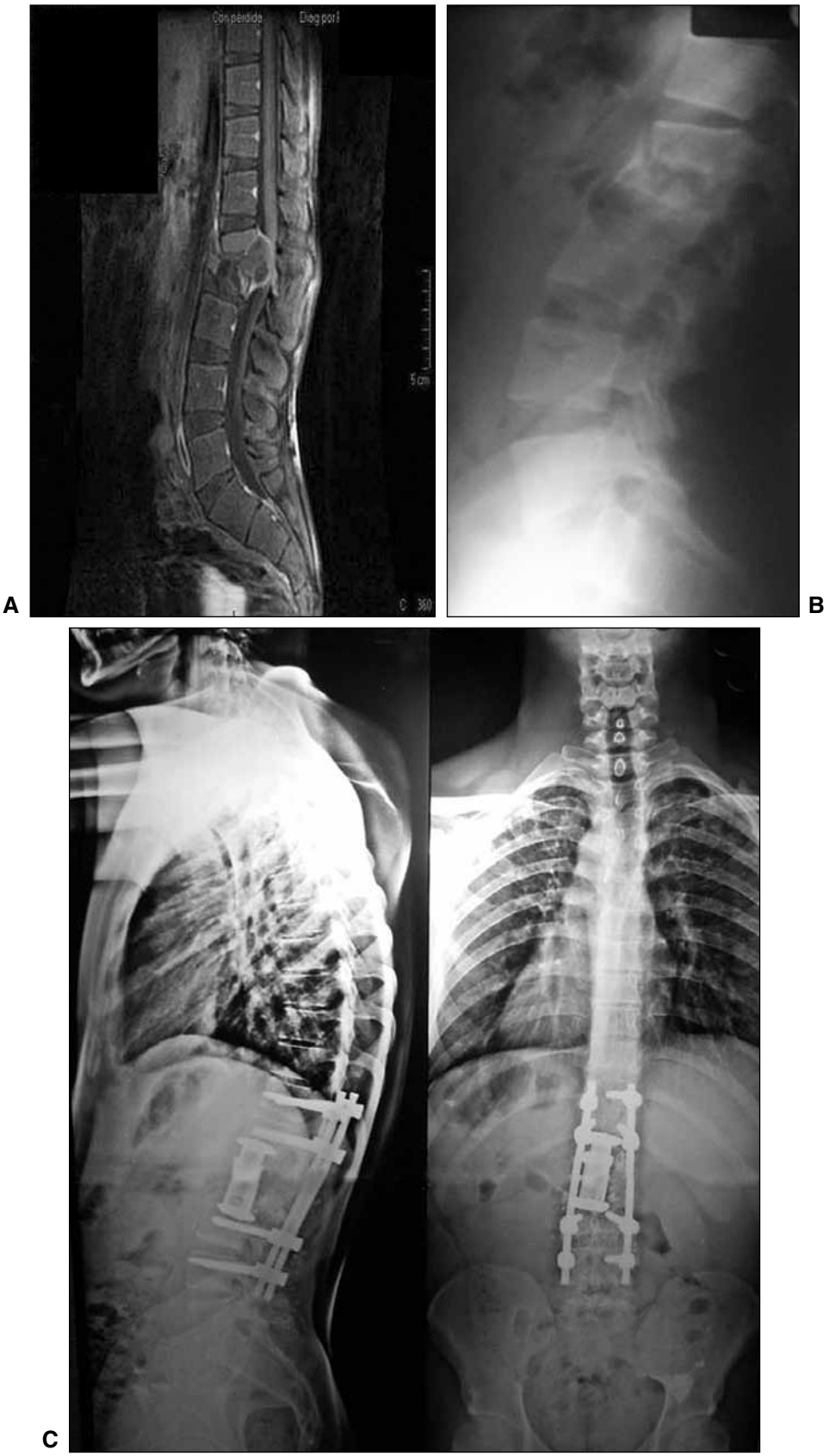

Figure 4. Case # 7. Seventeen year-old Caucasian male, GATA III (**A**), with great bone destruction but not so serious kyphosis (**B**). Neurological status at admittance: Frankel D. Post-operative checkup two years and half later (**C**): There is adequate correction of kyphosis; the neurologic status improved altogether (Frankel E).

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Table 9. Instrumentation vs. Initial Frankel progression*

	Improvement in initial Frankel	No changes in initial Frankel	Deterioration in initial Frankel
Isolated anterior instrumentation		1	
Isolated posterior instrumentation	1	1*	
Anterior and posterior instrumentation	2	1+	
No instrumentation	2	3**	

*In 11 patients operated on who survived (12 patients operated on with an immediately post-operative demise).
**Patients with no initial lesion (Frankel E).
+One patient with no initial lesion (Frankel E).
#One patient with no initial lesion (Frankel E)

Conclusions

In our province, Natives suffer the Pott's disease proportionately more frequently than other ethnic groups do, and what prevail are most advanced and severe presentations. They usually require surgical treatment.

The GATA Classification is useful to appreciate the morphologic severity of the lesions and decide surgical treatment. Double approaches and isolated posterior approaches are associated with better results than other surgical options are in such severe presentations. Mortality rates in patients with Pott's disease are high in our province.

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