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TREATMENT OF TETANUS AT "HOSPITAL DAS CLÍNICAS", SCHOOL OF MEDICINE, UNIVERSITY OF SÃO PAULO

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SUMMARY

The aim of the paper is to show the main problems related to non-umbelical tetanus, its treatment and the results obtained. From 1967 up to 1969, 376 consecutive cases were admitted at our Service, analyzed and listed according to origin, sex, severity, focus of infection, previous immunization if any, type of treatment and results, as well as the causes of death. The majority of patients hospitalized with tetanus came from the Capital of São Paulo. The disease has shown greater incidence in younger people. Prophylactic serum therapy and vaccination did fail in some instances. Patients were classified, as for the degree of severity, into three clinical groups. Correlation with age and certain types of foci has been studied. Regarding treatment, besides the classical means, an assisted or controlled respiration with curarization has been applied. The difficulties in finding an improved artificial respiratory method were analyzed. Finally, the main causes of death are discussed, as well as future possibilities in changing the present therapeutic scheme.

INTRODUCTION

The treatment of tetanus has recently undergone radical changes, enabling to save patients who, some years ago, would not have survived. These changes led to the management of serious forms of tetanus in real intensive care units, with the help of curarization and artificial respiration.

The high cost of this therapeutic system precludes its application by most of the other services taking care of tetanus cases; besides they lack the facilities we have at the Clinic of Tropical and Infectious Diseases, "Hospital das Clínicas" School of Medicine, University of São Paulo (Prof. João Alves Meira's ward).

Since 1967, severe cases of tetanus are being treated by curarization at the Department of Orthopedics and Traumatology (Respiratory Unit), under supervision of one of the Authors. However, due to a limited number of beds and nurses, there is at present no possibility to attend all the serious cases. The aim of the present paper is to stress the main problems related to the treatment of non-umbilical tetanus and the results obtained at our Service. A retrospective survey was carried out, based on 376 consecutive cases, admitted from 1967 up to 1969.

All these patients were listed according to origin, age, sex, portal of entry, previous immunization or not, type of treatment, results, and the causes of death.

In regard to severity, the cases under study have been divided in three groups, as suggested by REY & DIOP MAR [6], following

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MOLLARET's classification [2].

Group I — Benign forms, characterized by short duration and absence of spasm and dysphagia. Included are also patients with tonic, occasional spasms, disappearing completely on simple sedative treatment and not entailing swallowing difficulties.

Group II — Acute generalized forms, moderate degree, with stronger or milder dysphagia and spontaneous or induced tonic spasms, held more of less in check by symptomatic treatment.

Group III — The most serious forms, quick evolution, generally with complete dysphagia, tonic spasms, very frequently clonic or subintrants, resistant to sedative treatment unless extremely high dosages are used, with respiratory insufficiency and the need of artificial respiration.

TREATMENT

A) *Basic Treatment*

Consists of therapeutic measures applicable to all patients.

The infected portals of entry or those containing foreign bodies are treated locally with infiltration of 5,000 ATS, followed by debridment and wound cleansing.

Scarred and non-ulcered injuries are not handled.

Antibiotic therapy includes Penicillin G continuous intravenous ministration in dosages ranging from 4 to 8 million units in 24 hours. Should there be evidence of superinfection (usually pulmonary), 1 Gm per day of Streptomycin or else Chloramphenicol (1 -2 Gm/day, intravenously) are added. Other antibiotics are also frequently used, whenever suggested by bacteriological laboratory tests.

A single ATS shot is applied, intramuscularly, on the day of admission.

Dosages of 100,000 I.U. are used for adults, 50,000 I.U. for children, and 20,000 I.U. for newborn infants.

Muscle-relaxing and sedative treatment is applied with the use of Mephenesine (Tolserol(R)), 4 to 20 Gm daily in continuous intravenous ministration; Diazepan (Diempax(R)), 20 to 60 mg per day, given intramuscularly in 4 divided doses; and 1 to 6 Gm of chloral hydrate a day, by the rectal route, in 4 to 6 ministrations.

Patients with mild dysphagia or none at all are fed orally. Those with moderate or intense dysphagia and spasms are fed, during the acute phase, through the parenteral route with solutions of hypertonic glucose, amino-acids and, occasionally, plasma. The use of naso-gastric tubes is restricted to patients who have dysphagia but no spasma, to convalescents and cases submitted to curarization.

B) *Reanimation*

Tracheostomy is always indicated after a crisis of apnea when secretions, hard to eliminate, become accumulated in the tracheobronchial tree, as well as in the presence of a marked dysphagia or else when the prognosis is bad.

In crises of apnea, injections of 20 to 50 ml of Mephenesine are administered directly into the vein, accompanied by artificial respiration with a mask manual respirator (AIR-VIVA) and followed by emergency tracheostomy. Pacients showing intense respiratory insufficiency are treated with an Intermittent Positive Pressure Respirator (BYRD MARK-8), being the frequency of the apparatus regulated by the patient himself (assisted respiration).

C) *Curarization*

Recommended for Group III patients (whenever hospital facilities available). Galamine (Flaxedil R) at a 2% concentration is given in individual dosages for complete relaxation. Curarization is maintained through intramuscular injections (4 to 6 ml) every two hours. In the presence of intense spasms, the intravenous route is indicated; neuroleptic dehydrobenzoperidol (Droperidol R) was used for maintenance of sedation in these cases. Aerial routes are kept clear by associating physiotherapy (artificial cough, chest massages, postural drainage), constant flow (with proportionally increased dead space), efficient N-acetyl-L-cystein nebuli-

zation of trachea (1 ml every 4 hours), and generous rehydration (50 — 150 ml/kg/day of liquid).

RESULTS

In what regards sex, there was a prevalence of male patients (256 or 67.6%). As for origin, 60% of the patients came from the Capital of São Paulo, 39% from the interior, and 1% were from other States (3 cases). One hundred and fifty patients (40%) ranged in age from 30 days up to 20 years; 42% from 20 to 50 years and 18% were over 50 years old. Prophylactic serotherapy was seen to fail in 9 patients previously medicated with 5,000 to 10,000 I.U. Three patients developed the disease despite having been vaccinated with 3 doses of Tetanus Toxoid in the last 5 years, and one of them died. The total mortality rate was 32%. Distribution of the death incidence, according clinical classification, may be seen on Table I.

TABLE I

Clinical characteristics	Number of patients	Deaths
Group I	52 (14%)	0
Group II	205 (54%)	32 (16%)
Group III	119 (32%)	86 (73%)

Assisted respiration was used on 44 patients, 4 of whom survived.

Curarization was carried out in 67 cases of Group III, of which 38 died (57%).

TABLE II

Portal of entry	no. of Cases	no. of Deaths
Abortion (uterus)	14	10
Surgical (different types of surg.)	27	15
Drug injection	10	6

Analyzing fatality rates according to age, it was noted that 50% of the patients over 50 died.

Some portals of entry originated severe and often fatal forms of the disease.

Despite a retrospective survey, the cause of death could not be determined in several patients because of the lack of laboratory tests and necropsy in many of the cases. Nevertheless, some considerations on this point may be made. The main cause of death turned out to be a respiratory insufficiency which the majority of patients developed progressively due to tetanization itself (intense or subintrant spasms, hypertonia), infectious or non-infectious complications in the lungs (bronchopneumonia, atelectasis) and excessive sedation, without the aid of artificial respiration.

Another frequent cause of death was shock, sometimes toxemic (19 deaths), and, rarely, bleeding (1 case). In some instances, etiology of the shock syndrome remained obscure. Five patients died after a spasm of apnea, before being tracheostomized. As unusual causes of death we had uremia and iatrogenesis (in 2 patients each). Metabolic acidosis was frequently found in severe cases not submitted to artificial respiration, as stated by some patients low alcaline level. Necroscopic studies were carried out in 18 cases. Seven presented confluent bilateral bronchopneumonia; 9 had foci of bronchopneumonia and atelectasis besides lung congestion; one patient, carrier of an emphysema without further lung troubles, developed heart failure during artificial respiration and another, with nephrosclerosis, died from uremia and acidoses, not presenting any necroscopic evidence of pulmonary lesion.

COMMENTS AND CONCLUSIONS

The dosages of ATS we used are considered excessive and harmful by PATEL [4]. MOLLARET [2] does not include heterologous serum in his therapeutic scheme. Since, amongst us, allergic reactions to ATS were not so frequent as mentioned by these Authors, and considering our treatment conditions, we decided to keep on ATS therapy. New studies in this field or the possibility of

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using hyperimmune human gamma-globuline may alter our procedure.

Our muscle-relaxing and sedative therapeutic scheme gives good results in mild and moderate cases. Treatment of severe tetanus constitutes the real problem. Artificial respiration within the framework of our department was totally ineffective. There are several reasons to explain the bad results obtained, the most important being the use of associated miorelaxants which do not produce satisfactory effects (at least not at certain times) in what regards ventilation, the impossibility to improve medical and nursing care and to avoid frequent and severe lung infections, the type of respirator employed, with limited pressure and used only when respiratory deficiency is acute and the patient's conditions precarious. Once these therapeutic problems overcome, it would be possible, in our opinion, to attain better results with this technique, already successfully employed by DUREUX & CANTON [1], and even surpass those provided by curarization.

Mortality rates were high, considering that the majority of our patients was quite young (only 18% over 50 years of age). We believe that the new techniques of artificial respiration we are about to put into practice will considerably decrease the mortality rates.

At present we are administering Diazepan (Valium(R)) as an isolated sedative and muscle relaxant. Initial results are encouraging but inconclusive, since all the treated cases were mild.

RESUMO

Tratamento do tétano no Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo

O objetivo do trabalho é fornecer uma visão de conjunto sôbre os problemas relativos ao tratamento do tétano não umbelical neste Hospital e dos resultados obtidos. São analisados 376 casos consecutivos internados de 1967 a 1969.

Todos os casos foram tabulados em relação a procedência, sexo, gravidade, foco, existência ou ausência de profilaxia anterior, tipo de tratamento, resultados obtidos e causa do óbito. Verificou-se que a maioria dos tetânicos internados são procedentes da capital do Estado. A doença incide predominantemente em pessoas jovens. Em alguns casos, foram observadas falhas da soroterapia profilática assim como da vacinação. Os casos foram classificados em 3 tipos clínicos quanto a gravidade e feito o relacionamento gravidade-idade e gravidade associada a alguns tipos de foco. Em seguida são descritos os tipos de tratamento empregados ou sejam o esquema clássico, o uso associado de respiração assistida ou controlada com curarização e analisadas as dificuldades encontradas para melhor assistência respiratória. Finalmente são discutidas as principais causas de óbito e as possibilidades futuras quanto a alteração no esquema terapêutico atual.

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