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Ear involvement in human brucellosis

by

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Brucellosis is an infectious disease, characterized by fever, sweats, weakness, malaise and weight-loss that is transmitted to man from animals or animal products containing bacteria of the genus Brucella (Smith, 1979; Yow, 1981). Although this disease may affect almost any organ and any system in the human body, and in spite of the fact that hundreds of new cases of human brucellosis are diagnosed each year in the United States alone, nothing can be found in the Otolaryngological English literature regarding the ear involvement in human brucellosis. On the other hand, in the Polish literature, this subject is well discussed (Gladysz *et al.*, 1973; Jezyna *et al.*, 1972; Muszynski *et al.*, 1975; Osuch *et al.*, 1975).

In our out-patient clinic, we have had the opportunity to examine and evaluate a patient who had been suffering from acute brucellosis, and in whom one ear was affected by the disease process.

Case Report

A 40-year-old woman, working as a laboratory technician in the Clinical Microbiology Department, Hadassah University Hospital, Jerusalem, started to suffer from severe weakness, malaise, anorexia, arthralgia, night sweats, chills and low-grade fever, a few weeks after she had dealt with blood-culture samples of a patient who later was found to suffer from brucellosis. The physical examination, except for mild cervical lymphadenopathy, was normal. Blood tests: sedimentation rate—40 mm./l. hour; WBC 5,600/mm.^{3} with normal differential count; Hb.—12.4 g. per cent. Biochemical tests of the blood—within normal limits. The definitive diagnosis of brucellosis was made $2\frac{1}{2}$ months after the appearance of the symptoms, when a blood culture was found to be positive for Brucella Melitensis. The standard agglutination test was positive at a titre of 1:200, with a rise to 1:1,600 one month later. The patient was treated by tetracycline (Achromycin) 2 g./24 h. for four weeks.

For a while, there was a temporary improvement in the patient's general condition. Repeated blood cultures which were done during the following seven months were negative and the standard brucella agglutination test dropped to 1:200, but later on, the weakness, malaise, anorexia and arthralgia recurred, and 11 months after the first diagnosis of brucellosis, a blood culture again revealed brucella melitensis. The patient started to suffer from progressive hearing-loss in the right ear without tinnitus or dizziness. Otoscopic examination revealed an opacified, retracted ear drum on the right. The nasopharynx was normal. Audiometric examination showed a mild mixed type of hearing-loss on the right side (Fig. 1) with a 25–30 db. air-bone gap. There was a flat (Type B) tympanogram on the same side. Paracentesis revealed transparant yellow fluid which was sterile on bacteriological examination. The patient was treated by tetracycline 2 g./24 h. for two months, and streptomycin injections, 1 g./d. for 10 days, with good results. The general condition of the patient was markedly improved, and the following blood cultures were negative. The hearing level in the right ear remained static, and the otoscopic picture was of chronic adhesive process, with marked limitation of tympanic membrane movement.

Discussion

The first accurate description of human brucellosis was by Marston in 1863, and Bruce, a

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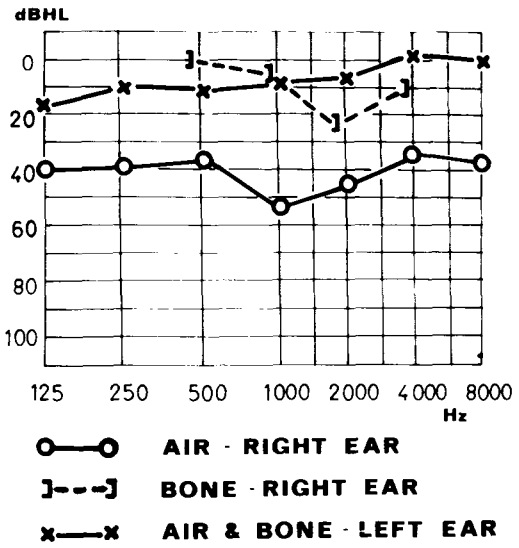


FIG. 1

British medical officer, was the first to isolate the aetiologic agent (Yow, 1981). Among the various species of the genus Brucella, three are most common as the cause of human brucellosis—B. melitensis, B. abortus and B. suis. They differ in degree of invasiveness and virulence. B. melitensis is the most invasive and produces the most severe disease (Yow, 1981).

Following inoculation and an incubation period which can last from seven days to three months, the brucella organisms invade the blood stream and cause bacteraemia with associated symptoms—fever, chills and sweats (Smith, 1979). If the human defence mechanisms fail and the patient is not treated by appropriate antibiotics (tetracycline+ streptomycin are the combination of choice), the bacteria can spread to all body tissues and form small granulomas, which may fuse to form a large granuloma that may suppurate and serve as a source for recurrent spread. Persistent bacteraemia may lead to multiple systems involvement by granulomas.

The diagnosis of brucellosis is based on the clinical picture—(intermittent fever, chills, anorexia, malaise and sweats), serologic tests and the isolation of brucella organisms from the patient by appropriate cultures. The most common signs of brucellosis in addition to fever are lymphadenopathy (40 per cent), splenomegaly (40 per cent) hepatomegaly (8 per cent) and tenderness over the spine. Dizziness and tinnitus are occasionally mentioned in the general literature, but specific data regarding the clinical and pathological findings in ears affected by the brucella organisms are missing.

On the other hand, several series are reported in the Polish literature in which the audiological findings in patients who have been suffering from brucellosis are reviewed. Among 147 cases of brucellosis which have been treated in the department of Infectious Diseases, Medical Academy in Wroclaw from 1951 to 1971 (Gladysz *et al.*, 1973), six were members of the microbiology laboratory personnel. Fifty-two patients (33 per cent) were found to suffer from hearing-loss due to their disease. The authors claim that the hearing-loss usually appears early in the course of the disease, and it can help in early diagnosis in otherwise asymptomatic patients.

In another series (Muszynski *et al.*, 1975) from a different institute, 105 patients suffering from chronic brucellosis were reviewed. The diagnosis was based on clinical, epidemiological and serological data and on specific cultures. Tinnitus was a very common complaint among these patients, and 16 of them suffered from recurrent attacks of vertigo. Hearing-loss was found in 76 patients but 12 of them were omitted from this study because the causative relation between the hearing-loss and the disease could not be proved. All these 64 cases of hearing-loss were of the sensori-neural type: 26 patients with mixed hearing-loss, 34 with moderate and four cases with severe perceptive hearing-losses. Sixteen of the 67 patients examined showed diminished sensitivity of the labyrinths to caloric stimulation. The authors' view is that the damage to the inner ear is due to the brucella toxin penetrating into the labyrinth and affecting the cochlear nerve.

In another survey from a further epidemiological institute (Osuch *et al.*, 1975) 120 patients suffering from chronic brucellosis were screened by audiological test, and 93 of them were found to suffer from hearing-loss which could be attributed to the disease. Progressive impairment of hearing was found in 11.7 per cent of the patients. In the remaining patients therapy halted the progress of the disease and in 15.8 per cent some improvement was obtained.

Jezyna *et al.* (1977), in their publication in the *Polish Otolaryngologic Journal*, described 150 patients with chronic brucellosis. A perceptive type of hearing-loss was found in 48 per cent of all patients. In 11 patients (6.1 per cent) a conductive hearing-loss was found (4 per cent—moderate, 2.1 per cent—severe).

These surveys in the Polish literature show very clearly that brucellosis may quite often cause damage to the ear with considerable hearing-loss, either in the early stage or in the late, chronic form

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of the disease. The damage is usually to the inner ear (and/or the VIIIth nerve) and is manifested by a perceptive type of hearing-loss, tinnitus, dizziness and reduced response to caloric irrigation. A conductive hearing-loss, which is less common, may be due to specific granuloma formation in the middle ear, with eventual scarring and development of chronic adhesive process.

The case presented here showed a mixed type of hearing-loss which is the result of combined damage to the middle and inner ear. The otologic examination, the flat tympanogram and the results of the myringotomy all point to a chronic fibrotic process, presumably due to brucella infection, as the cause of the air-bone gap.

There was no past history of ear infection, nor recent symptoms and signs of acute otitis which would otherwise explain the findings in the right ear.

Thus, ear involvement in human brucellosis is a common finding which, surprisingly, is not documented in the English literature and is not mentioned in the otolaryngologic and clinical microbiologic textbooks. The practising otolaryngologist should be aware of this possibility in order to start the treatment early in the course of the disease in trying to avoid irreversible ear complications.

Abstract

A case report of mixed-type hearing loss following brucella infection is presented. Damage to the ear in brucellosis is well documented in the Polish literature whereas, surprisingly, it is not mentioned in the otolaryngologic and microbiologic English literature. Otolaryngologists should be aware of possible ear damage in brucellosis, in order to be helpful in the diagnostic process, with the aim of starting antibiotic treatment as soon as possible, in order to prevent irreversible ear damage.

References

GLADYSZ, A., JELEWSKA-KANIAKOWA, Z., and GAJEWSKI, J. (1973) Chronic Brucellosis. *Wiadomosci Lekariskie* (Pol), **26(8):** 705–710.

JEZYNA, C., FILIPOWSKI, M., and KVROCZYCKA, I. (1977) Damage to the hearing organ in the clinical picture of chronic brucellosis. *Otolaryng. Pol.*, **31(6):** 631–635.

MUSZYNSKI, M., ZAKRZEWSKI, J., KICZKA, W., and JUSZCZYK, J. (1975) State of hearing, equilibrium, smell and taste in patients with chronic brucellosis. *Przeg. Epid. Rok.* (Pol), **29(2):** 207–213.

OSUCH, T., OSUCHOWA, J., and JANCZEWSKI, G. (1975) Evaluation of dynamics of impairment of hearing in chronic brucellosis. *Przeg. Epid. Rok.* (Pol), **29(2):** 201–205.

SMITH, I. M. (1979) Brucella species. In: *Principles and practice of infectious diseases*. Mandell, G. L., Douglas, R. G., and Bennett, J. E. (Editors). John Wiley & Sons, 1979, pp. 1772–1784.

YOW, M. D. (1981) Brucellosis. In: *Textbook of pediatric infectious diseases*. Feigin, R. D., and Cherry, J. D. Editors. W. B. Saunders comp. pp. 828–833.

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