Meningitis due to *Gemella haemolysans* after radiofrequency trigeminal rhizotomy

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SUMMARY Meningitis due to *Gemella haemolysans* developed in a 73 year old woman after thermolysis of the Gasserian ganglion for trigeminal neuralgia. The taxonomy of this organism is discussed, and previous cases of infection are reviewed.

Gemella haemolysans (formerly *Neisseria haemolysans*) is a commensal of the upper respiratory tract which has received little recognition by clinical bacteriologists and is seldom recognised as a cause of infection. We describe here a case of meningitis due to *G. haemolysans* which followed radiofrequency rhizotomy of the Gasserian ganglion.

Case report

A 73 year old woman suffered from right sided trigeminal neuralgia for one year, obtaining only partial relief from carbamazepine (Tegretol). Her respiratory tract appeared healthy, and radiographs of the paranasal sinuses and axial views of the skull and postnasal space were normal. Radiofrequency rhizotomy of the second and third divisions of the right trigeminal nerve was carried out.

In this operation, which is performed under a suitable neuroleptoanalgesia, the lower face is prepared with a solution of Hibitane in spirit. The cheek is infiltrated with 1% Xylocaine solution, and then a sterile needle, insulated along its shaft for all but the terminal 7 mm, is passed through the cheek to the base of the skull. Entry into the foramen ovale is confirmed on radiograph and by showing an efflux of cerebrospinal fluid (CSF) through the needle hub. A stimulating current is passed through the needle to the trigeminal sensory root using a radiofrequency lesion generator, the appropriate division in which the pain was occurring is identified, and a thermal lesion made at this location. The needle is then withdrawn. Total operating time is generally 1 h. In this particular patient, anatomical localisation proved difficult, and leakage of CSF occurred

throughout the procedure, although it produced the intended analgesic result.

The day after operation the patient was free from pain but felt generally unwell, with a fever of 38°C. On the second postoperative day she developed right sided headache and neck stiffness. Meningitis was diagnosed and a lumbar puncture was performed. The CSF contained 11 000 neutrophil polymorphonuclear leucocytes $\times 10^6/l$, with a protein concentration of 3.3 g/l and a reduced glucose content. A Gram stained film of the CSF deposit showed numerous Gram negative diplococci, mostly intracellular, and a provisional diagnosis of meningococcal meningitis was made.

Because of a history of penicillin allergy, the patient was treated with chloramphenicol 0.6 g every 6 h and sulphadiazine 1 g every 6 h, both given intravenously for nine days; this was followed by chloramphenicol 0.5 g every 6 h orally for a further five days. She responded well to treatment, although diminishing fever persisted until the eighth postoperative day. Three further specimens of CSF taken during the course of treatment showed only a moderate lymphocytosis and were sterile on culture.

BACTERIOLOGY

Culture of the CSF deposit produced a scanty growth of small greyish colonies on horse blood agar after incubation at 37°C for 48 h both aerobically, with or without additional CO₂, and anaerobically. The colonies were surrounded by a definite zone of α -haemolysis. On subculture, growth at 48 h was profuse at 22°C, 30°C, and 42°C. Growth did not occur on MacConkey's medium. Gram stain of a broth culture showed mainly Gram negative cocci which were single, in pairs with flattening of the adjacent surfaces, or in short chains. In addition, there were larger single cocci which were undoubtedly

Gram positive.

The organism was non-motile, catalase negative, and oxidase negative (weak positive reaction with Kovacs' reagent at 60 s). Growth did not occur in Hugh and Leifson's O-F medium at 48 h. The organism failed to survive heating to 60°C for 30 min. The following reactions were obtained using the API Staph system (API Laboratory Products Limited) after incubation for 48 h: nitrate reduction negative; acetyl-methyl-carbinol production positive; arginine dihydrolase negative; urease negative; acid produced from glucose, maltose, fructose, sucrose, and mannose; no acid from lactose, trehalose, mannitol, xylitol, raffinose, or xylose. The organism was sensitive to penicillin, sulphonamide, and chloramphenicol by the disc agar plate method. These properties corresponded closely to the description of *G haemolysans* given in Bergey's manual,¹ our strain differing only in its pronounced α -haemolysis on horse blood agar. The organism was excluded as *Aerococcus viridans* by Dr G Colman and confirmed as *G haemolysans* by the National Collection of Type Cultures, Colindale.

Discussion

In 1938, Thjøtta and Bøe described a haemolytic species of *Neisseria* Trevisan, which they named *Neisseria haemolysans*.² It was biochemically similar to *N sicca*, but antigenically distinct. Berger and Wezel³ found that this organism was less readily decolorised in the Gram stain than were other neisseriae. Berger⁴ further showed that it was catalase negative, oxidase negative, and attacked carbohydrates fermentatively, unlike neisseriae; he considered that it should be allocated to a new genus *Gemella* ("little twin") within the family *Neisseriaceae*, with a single species *Gemella haemolysans*. This view was supported by gas chromatographic studies, which showed that the fatty acid and sugar composition of *N haemolysans* ATCC 10379 differed from that of other neisseriae studied.⁵ Reyn *et al*⁶ showed by electron microscopy that the cell wall structure, internal structures, and mode of division of *N haemolysans* ATCC 10379 were typical of Gram positive cocci. The cell walls were comparatively thin and of varying thickness, which accounts for the variability of the Gram reaction. The DNA base ratio of the organism was 33.5 mean moles per cent, which is considerably lower than that of neisseriae but similar to that of the *Streptococcaceae*. On these grounds, Reyn *et al*⁶ recommended that *Gemella* should be removed from the family *Neisseriaceae* and included as a new genus within the *Streptococcaceae*. This classification was accepted in the 8th edition of Bergey's manual,¹ in which a full

description of the organism appears. Subsequently, Wilkinson and Jones,⁷ in a numerical taxonomic study of *Listeria* and related bacteria, obtained results which agreed with this classification, but considered finally that *Gemella* should be included with *Listeria*, *Erysipelothrix*, *Lactobacillus*, and *Streptococcus* in the family *Lactobacillaceae*.

Recent studies have shown that the peptidoglycan of *G haemolysans* is biochemically identical to that of various other Gram positive organisms, such as streptococci and lactobacilli.⁸ Also, 16S rRNA analysis has shown that *G haemolysans* is phylogenetically related to those Gram positive bacteria with low GC percent content, including *Clostridium*, *Peptococcus*, *Streptococcus*, *Staphylococcus*, *Lactobacillus*, and *Kurthia*.⁸ The physiological properties of *G haemolysans* are indistinguishable from those of *Streptococcus morbillorum*.⁹

Thjøtta and Bøe² isolated their strain from the sputum of a patient with chronic bronchitis, and the organism is considered to be a commensal of the oropharynx and respiratory tract.¹ One of the strains of *G haemolysans* studied by Reyn *et al*⁶ was isolated from a child's blood culture, which also yielded a viridans streptococcus. Infections caused by this organism were unknown until 1978–9, when three cases of endocarditis due to *G haemolysans* were diagnosed in three different hospitals in France, the strains being identified subsequently by the Pasteur Institute, Paris.¹⁰ All three patients had pre-existing dental sepsis. One of the patients lapsed into coma; the CSF showed pleocytosis but was sterile on culture. Because the organisms isolated from blood cultures were Gram variable, catalase negative, oxidase negative, and had the typical antibiotic sensitivity pattern of a streptococcus they were initially sent to a streptococcus reference laboratory for identification. The strains showed β -haemolysis only on certain media containing rabbit blood, and showed incomplete haemolysis on horse blood agar. They were highly sensitive to penicillin and to a lesser degree to the cephalosporins and vancomycin; moderately resistant to aminoglycosides; and resistant to sulphonamides and trimethoprim. Synergy was shown between penicillin or vancomycin and streptomycin or gentamicin against all strains.¹¹

There have been three further reports of *Gemella* infections, all from France, including a further case of endocarditis¹² and two cases of septicaemia without endocarditis in patients with alcoholic cirrhosis.^{13, 14}

Meningitis seems to be a rare complication of radiofrequency rhizotomy of the trigeminal ganglion. In a series of 274 patients, submitted to a total of 353 procedures, aseptic meningitis occurred postoperatively in only one patient, who rapidly

recovered.¹⁵ In another series of 1200 cases there were only two instances of bacterial meningitis, and both patients recovered rapidly without complications (Professor Jean Siegfried, personal communication). In the present case, the portal of entry of the infecting organism is uncertain. We ascertained during the procedure that the needle did not transfix the buccal mucosa, but it is possible that the organism was already present in the submucosa and was carried as a contaminant up through the foramen ovale.

The present case provides the unique instance of a rare postoperative complication caused by an organism which, at the time of its isolation in 1981, had not previously been reported as a pathogen.

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