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Opinion

Gonococcal Ophthalmia Neonatorum Infection Transmitted at Birth

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Opinion

Neisseria gonorrhoeae is a highly adapted, inherent human pathogen that causes the sexually transmitted infection gonorrhoeae [1,2]. This human infection remains a significant concern, with a high worldwide frequency and a profound impact on reproductive and neonatal health [3,4]. *N. gonorrhoeae* is rapidly becoming a superbug and there is no effective vaccination to prevent gonococcal infections [5,6]. There is an urgent need for increased research into molecular targets for the development of therapies with novel modes of action and prophylactic vaccines(s) [7-9]. Global proteome techniques are excellent for guiding these research strategies [10,11]. Recent quantitative proteomics studies have shed light on the pathways *N. gonorrhoeae* uses to adapt to different lifestyles and microecological niches in the host, while comparative 2D SDS-PAGE analyses have been used to decipher spectinomycin resistance mechanisms [12]. Untreated or improperly treated gonorrhoeae can cause serious complications such as pelvic inflammatory disease and infertility in women, epididymitis in men, and vision-threatening conjunctivitis in children born to infected mothers [13-15]. Gonococcal conjunctivitis affects two main groups: new-borns (*ophthalmia neonatorum*) and sexually active people [16]. Gonococcal ophthalmia neonatorum is acquired postpartum from an infected mother and affects 30% to 50% of neonates exposed perinatally [17].

A recent systematic review published data favouring the prophylactic use of erythromycin and povidone-iodine over silver nitrate as prophylactic agents against Chlamydia ophthalmia neonatorum, although there is no evidence in the literature of effective prophylaxis against the gonococcal form of ophthalmia neonatorum [18]. Furthermore, recent studies confirm conclusively that universal prophylaxis against ophthalmia neonatorum has very limited benefit [19-21]. This assertion can be shared in reference to developed countries, but it may not look valid in developing countries or countries that are deemed developed yet have a large influx of immigrants [20]. As a result, we believe that the decision to use a universal prophylaxis against ophthalmia neonatorum should reflect the characteristics of the population under consideration, and that the most effective agents, based on data in the existing literature, could be erythromycin or fusidic acid, which appears particularly promising [13,22]. The development of gonorrhoeae is hyperacute, with chemosis and copious purulent discharge [23]. Because of the capacity of N. gonorrhoeae to penetrate intact corneal epithelium, symptoms can escalate quickly and have fatal ocular repercussions [24].

The clinical spectrum of this infection can vary widely, with some cases presenting with isolated purulent conjunctivitis and others involving the cornea [25]. The extent of corneal involvement in gonococcal ocular infection can also vary widely, ranging from subepithelial and/or stromal infiltrates to corneal ulceration with subsequent globule thinning and perforation, culminating in endophthalmitis [26,27]. In these circumstances, corneal involvement is of particular concern as it can often result

in significant visual impairment [26,27]. Gonococcal infections can cause significant edema in the periorbital area, which could mimic preseptal cellulitis [28]. The swelling can sometimes be severe enough to impede extraocular movements, leading to a misdiagnosis of orbital cellulitis [16]. Diagnosis is sometimes delayed due to the subtlety or lack of major symptoms, nonetheless, prompt detection and treatment is crucial to minimize corneal damage and ultimately ensure vision preservation [13,17]. Few studies have determined the frequency of gonococcal infections, however, a recent study in Ireland found that the prevalence of N. gonorrhoeae was 0.19 cases per 1000 patients screened for ocular emergencies, with most cases occurring between the ages of 20 and 25 years [29].

Antibiotic resistance is still an important factor in the treatment of gonorrhoea [30]. Antibiotics and other public health advances have greatly altered the context for this ophthalmia neonatorum throughout the years [13]. Most women who get prenatal care are checked for Chlamydia and gonorrhoeae and, if infected, are effectively treated with antibiotics before birth [19]. If a new-born develops neonatal ophthalmia in a setting with good postpartum care, blindness is exceedingly improbable if antibiotic treatment is available [16,19]. Rates of ophthalmia neonatorum are frequently quite low in developed nations, the rate in the United States is barely 8.5 per 100,000 births [31]. The quality of evidence from randomized and quasi randomized studies on the effectiveness of preventive medicines in preventing new-born ophthalmia is low [6]. Although prophylaxis appears to minimize the risks of neonatal ophthalmia, all preventive treatments have clinically substantial failure rates [29]. In impoverished countries, especially in Africa, there is practically limited information about ophthalmia neonatorum.

With increasing antibiotic resistance, the development of novel vaccines or antimicrobial agents is of crucial importance and global and quantitative proteomic methods are beginning to offer viable targets in the fight against *N. gonorrhoeae* [11,12]. Proteomic techniques and assays will serve as the basis for future research in the areas of structural vaccinology, protein-protein interactions and *N. gonorrhoeae* physiology, and have already provided new insights into how to combat this important, elusive disease [8]. Current recommendations for *N. gonorrhoeae* treatment duration are based on relatively limited data, as evidenced by the significant heterogeneity of recommendations among global standards. In addition, the recommendations do not address the spectrum of *N. gonorrhoeae* severity as most of the data comes from case series and reports. As a result, we highlight the need for further research into the treatment and outcomes of *N. gonorrhoeae*, particularly to investigate whether higher or longer doses of antibiotics are required in more severe conditions.

Conflict of Interest

No conflict of interest.

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