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Case Report **Open Access**

'Metastatic seed' of cholera in Edo State, Nigeria: a case report

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Abstract:

There were reported cholera epidemics in some States in Nigeria. Cholera is an acute diarrhea disease with marked epidemic propensity, caused by colonization of the small intestine by *Vibrio cholerae* serogroup 01 or 0139. Cholera, like other infectious diseases epidemics, has propensity for sending metastatic seed to any susceptible remote community. If the metastatic seed can be promptly diagnosed and managed appropriately, the spread and development of new epicenter can be aborted. This report is a case of metastatic cholera who presented in a tertiary hospital in Edo State, Nigeria. The case was promptly detected and effectively managed using good surveillance system, inter-departmental collaboration, swift responses, good laboratory practices, patient isolation and infection prevention and control measures, coupled with appropriate fluid and antimicrobial treatments. This prevented cholera epidemic in the hospital and Edo State in general.

Keywords: Cholera; epidemics; surveillance; control

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«Graine métastatique» de choléra dans l'État d'Edo, au Nigeria: à propos d'un cas

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Résumé:

Des épidémies de choléra ont été signalées dans certains États du Nigéria. Le choléra est une maladie diarrhéique aiguë à propension épidémique marquée, causée par la colonisation de l'intestin grêle par Vibrio cholerae sérogroupe 01 ou 0139. Le choléra, comme d'autres épidémies de maladies infectieuses, a tendance à envoyer des semences métastatiques à toute communauté éloignée sensible. Si la semence métastatique peut être rapidement diagnostiquée et gérée de manière appropriée, la propagation et le développement d'un nouvel épicentre peuvent être interrompus. Ce rapport est un cas de choléra métastatique qui s'est présenté dans un hôpital tertiaire de l'État d'Edo, au Nigeria. Le cas a été rapidement détecté et géré efficacement grâce à un bon système de surveillance, une collaboration interdépartementale, des réponses rapides, de bonnes pratiques de laboratoire, l'isolement du patient et des mesures de prévention et de contrôle des infections, associées à des traitements liquidiens et antimicrobiens appropriés. Cela a empêché une épidémie de choléra à l'hôpital et dans l'État d'Edo en général.

Mots clés: Choléra; épidémies; surveillance; contrôler

Introduction:

There were reported cholera epidemics in some States in Nigeria (1). The worst affected states are Bauchi, Bayelsa, Gombe, Kaduna, Kano, Plateau and Zamfara (1). In 2021, as at June 21, 10,833 suspected cases of cholera have been reported with 112 cases confirmed, and 289 deaths (1). The Nigeria Center for Disease Control (NCDC) urges members of the public to be aware of the risk of the disease and adhere to precautionary measures to ensure safety (1).

Cholera is an acute diarrhoea disease with marked epidemic propensity, caused by colonization of the small intestine with *Vibrio cholerae* serogroup 01 or 0139 (2). The disease is due to the enterotoxin produced by the pathogen which causes mild to fulminant diarrhoea (2) and leads in some cases to rapid dehydration, acidosis, circulatory collapse and death within hours (3). Cholera is associated with poor sanitation, and direct contact with contaminated food or surface water for drinking, bathing, cooking, and irrigation, as major risk factors (3). Infection occurs through the ingestion of water contaminated by faeces and vomitus or food contaminated by faeces, dirty water, soiled hands, or rarely by flies (3). Raw or undercooked food from polluted areas can be responsible for outbreaks. Some outbreaks are explosive, caused by contamination of a common source, while in some outbreaks, the modes of transmission may reflect person-to-person spread (4,5).

Cholera, like other infectious disease epidemics, has propensity for sending metastatic seed to any susceptible remote community, especially in this era of rapid human movements across geographical locations (5). This results in propagated source pattern of epidemics spread (4,5). If the metastatic seed can be promptly identified and managed appropriately, the spread and development of new epicenter can be aborted (4). We present here the case of a cholera patient admitted with pathognomonic features of the disease and was promptly diagnosed, treated and thus breaking the chain of possible propagated source cholera in Edo State of Nigeria.

Case report:

A 30-year-old Hausa male apprentice to a truck driver enroute from Kaduna to Benin-city presented to the accident and emergency (A&E) unit of the Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria on June 2, 2021 with history of multiple episodes of watery, non-mucoid, non-bloody stooling of a few hours' duration, several bouts of non-bilious, non-projectile vomiting, body weakness and inability to move the left leg. He had no history of fever, but there was abdominal pain and reduced urine output. The onset of the illness was rapid, shortly after eating 'okpa' (a traditional Nigerian delicacy) (6) on transit. He was severely dehydrated with altered sensorium at presentation (Glasgow coma score was 10). Pulse was fast and thready (pulse rate of 118 beats per minute), blood pressure was not recordable at presentation. Patient was not anaemic, and was anicteric and acyanosed. The stool was rice water in appearance.

Patient was admitted with the working diagnosis of acute gastroenteritis complicated with dyselectrolytaemia. The medical microbiology team was promptly informed to investigate the case. Stool specimen of the patient was collected into a bottle containing alkaline peptone water and immediately transported to the microbiology laboratory of the hospital for analysis. Specimens for full blood count (FBC), electrolytes, urea and creatinine, HIV screening and blood culture were also collected. Intensive intravenous rehydration using Ringer's lactate alternated with normal saline was immediately instituted.

In the laboratory, wet film microscopy revealed densely populated and highly motile bacteria while Gram stain smear showed Gram-negative curved bacilli (Fig 1). The preliminary test result was communicated to the managing team in the ward. The stool specimen was inoculated on thiosulphate citrate bile salt sucrose (TCBS) agar medium and plate incubated aerobically for 18 hours, which grew bright-yellow pure discrete colonies (Fig 2). The isolate was biochemically identified as oxidase and catalase positive, producing yellow butt and yellow slant on triple sugar iron (TSI) agar. Furthermore, a rapid immunochromatographic cassette (Standard Diagnostics, Inc, Republic of Korea) test to differentiate between *V. cholera*e 01 and 0139 confirmed the aetiologic agent to be *V. cholerae* 01 serotype (Fig 3).

The patient was isolated and other infection prevention and control measures such as hand hygiene, use of personal protective equipment, waste and linen management were enforced. Doxycyline therapy was commenced and rehydration was continued. Stooling and vomiting stopped after about 36 hours of hospitalization. Patient was discharged on day 4 of admission, after proper health education on the need for good food, water, personal and environmental hygiene.

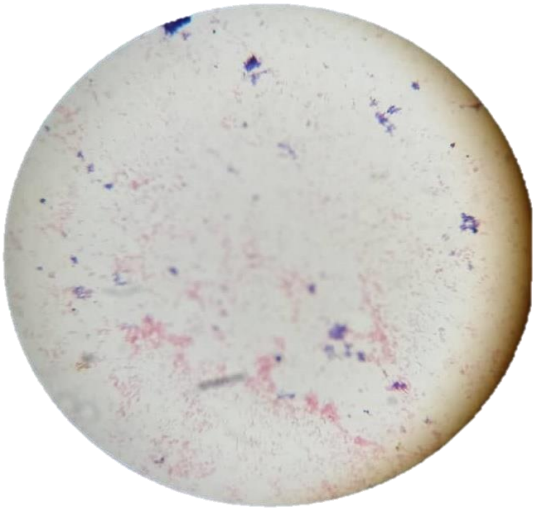

Fig 1: Gram stain slide of *Vibrio cholerae* shows Gram-negative curved rods (x1000 magnification)

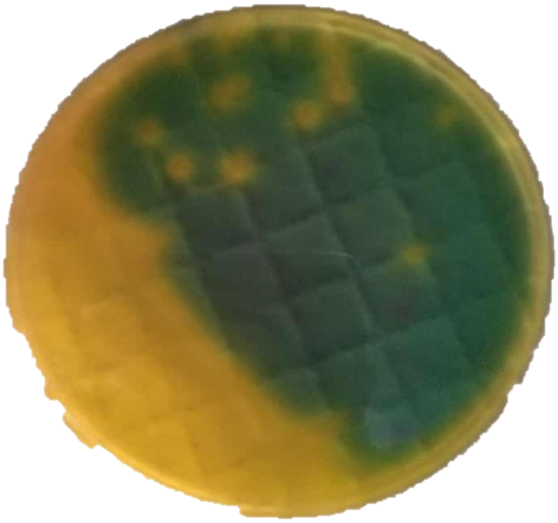

Fig 2: Golden yellow colonies of *Vibrio cholerae* on thiosulphate citrate bile salt agar plate

Fig 3: Confirmation of *Vibrio cholerae* serotype 01 on immunochromatographic cassette

Discussion:

An infectious disease epidemic, just like malignant tumor of the body, has capacity to send metastatic seed to another site away from the epicenter to start a new propagated outbreak (7,8). This was the experience in this case, a traveler from Kaduna (cholera epicenter at the time) came to Edo State, to serve as a seed to start up cholera epidemic in the State. If not for prompt detection and effective case management, Edo State would have joined the league of cholera outbreak States for the period. In keeping cognizance of this, emergency preparedness team, especially the surveillance team, must watch out for any possible seed from a neighboring or distant epicenter whenever there is an outbreak.

Cholera control aiming at reduced morbidity and mortality from outbreaks required a multifaceted approach (3). This includes surveillance, adequate good water supply, sanitation and hygiene, social mobilization, treatment and oral vaccines (3). Effective implementation of this World Health Organization recommended approach was seen in the sporadic case above. The first medical contact to the patient had high index of suspicion for cholera in the patient based on his good working knowledge of case definition for cholera, the travel history from cholera infected State and the clinical presentation of the case, vis-a-vis several bouts of 'rice-water' stooling and vomiting with severe dehydration. High index of suspicion coupled with working knowledge of case definition are pivotal to effective disease surveillance (9). In view of this, as part of emergency preparedness, healthcare workers should be periodically updated on the epidemiology of diseases under surveillance, including the case definitions and clinical features of the disease.

A good surveillance system aiming at epidemic and case detection with confirmation is dependent on availability of competent and reliable laboratory where aetiologic cause of the disease can be ascertained (10). The laboratory team at the centre of this report is efficient as evident in the promptness and accuracy of the diagnosis. Good laboratory system as the hub of infectious disease surveillance is

exemplified in the creation of Pulsenet International, a network of national and regional laboratory networks dedicated to tracking foodborne infections world-wide. Each laboratory utilizes standardized genotyping methods, sharing information in real-time. The resulting surveillance provides early warning of food and waterborne disease outbreaks, emerging pathogens, and acts of bioterrorism.

Furthermore, good intersectoral and interdepartmental collaborations are expedient in epidemic preparedness and containment. A disjunction between the clinicians and the laboratory can leads to missed cases and escalation of epidemic. The clinicians and the laboratory synergistically contained the intending cholera epidemic in the Edo State of Nigeria by prompt consult to the medical microbiology team and immediate response by the latter in collecting stool specimen and analyzing it in good time. The specimen culture isolate was confirmed to be *V. cholerae* serotype 01, and the laboratory communicated their findings to the clinician without delay. These measures strengthened the zeal of the teams to aggressively combat the case and observe all necessary standard precautions. Quality assurance in laboratory practice is not only on generating reliable results, but include timely and appropriate communication of the result to the clinician for proper case management. Hence, it is not adequate for the laboratorians to generate good results, but the results must be communicated rapidly to the field officers/clinicians for evidence-based definitive management of the affected people.

In addition, with good IPC practices including patient isolation, prompt notification, effective treatment, excellent use of personal protective equipment, hand hygiene, good waste management and environmental sanitation, the cholera case was cured without transmission to other patients, healthcare workers or the community. It is worthy of note that, outbreak containment is impossible without implementation of IPC measures (11). According to WHO, IPC is a practical evidence-based approach, preventing patients and healthcare workers from being harmed by avoidable infections. Defective IPC causes harm and can kill (12). Effective IPC requires constant action at all levels of the heath system, including policymakers, facility managers, health workers and those who access health services. IPC affects all aspects of healthcare, including hand hygiene, injection safety, antimicrobial resistance and how hospitals operate during and outside emergencies (12). In rural setting of low- and middle-income countries, such as Irrua, support for IPC is very important because secondary infections may negatively affect healthcare delivery and medical hygiene standards (12).

Effective management of cholera includes intravenous rehydration in severe cases, where oral rehydration will be inadequate and slow (3). Antimicrobial treatment based on microbial sensitive profile is also very important. This patient was adequately rehydrated and was treated with doxycycline, the drug of choice for cholera. Doxycycline therapy in cholera shortens duration of diarrhea, reduce the volume of fluid needed for rehydration and more importantly can stop excretion of *V. cholerae* in stool within 48 hours (3,5). No wonder, the patient was fit for discharge within a very short period having been well managed.

In conclusion, good emergency preparedness comprising disease surveillance system, competent manpower (health workers), good laboratory services, case management, and IPC are undisputedly the best measures for halting infectious diseases outbreak. All sectors saddle with containment of disease outbreaks must work concertedly to make it work.

Contributions of authors:

AGM coordinated the resident doctors' laboratory testing of the patients' samples, co-managed the patient with the internal physician, was involved in specimen analysis, and initiated and wrote the case report. SOS was involved in specimen analysis, provided the immunochromatographic test kit for typing the isolate and reviewed and made corrections in the draft case report. UAE collected and analyzed the patient's specimens, participated in patients' clinical management, and contributed to writing the report. IKO was the consultant involved in patient management, invited the medical microbiology team and contributed to report writing. OGO, OTO and OJI participated in the laboratory analysis of the patient's specimen, were involved clinical management of the patient and ensured compliance with infection prevention and control measures.

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Conflict of interest:

No conflict of interest is declared.

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