UNUSUAL HISTOLOGICAL FINDINGS OF THE APPENDIX FOLLOWING APPENDECTOMY; A TEN YEAR HISTOPATHOLOGIC STUDY.

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ABSTRACT

Introduction
Lesions of the appendix are common. The appendix is however exposed to other uncommon but deleterious lesions which if not detected early and prompt attention given immediately, may result in morbidity and mortality.

Materials and methods
This was a retrospective study which involved 1171 respondents aged between 2 and 80 years. Demographic data were obtained from the archives of the histopathology department of University of Benin Teaching Hospital. Results were analysed with chi square test and results presented in frequencies tables.

Results
A total of 1171 samples were analysed out of which 17 were miscellaneous findings. This included 7 diagnosed for chronic granulomatous. Parasitic infestations were observed in only two female and 1 male case respectively and their ages ranged between 21 and 50 years. One case each was seen in Carcinoid, intestinal necrosis, intestinal infarction, chronic HPV, haemorrhagic appendix (which was found in a patient between 70 and 80 year age range).

Conclusions
This study has further emphasised the need for routine histopathologic analysis of all appendices following appendectomies regardless of the macroscopic appearance.

KEYWORDS; Appendix, appendectomies, Carcinoid, Chronic granulomatous Inflammation

INTRODUCTION
The vermiform appendix is a small finger sized structure located at the end of the caecum towards the beginning of the large intestine. This wormlike (vermiform) structure ranges typically between two and eight inches in length though it may be less than an inch. The appendix is longest in childhood and gradually shrinks with age. Its wall is composed of all layers typical of the intestine and contains a concentration of lymphoid tissues similar with the other lymphoid tissues.

Several functions of the appendix have been postulated including exocrine, endocrine and neuromuscular functions. The most important is however its immunologic function. Craig and Ceba in 1975 demonstrated that the appendix was rich in B and T lymphocytes which were important in the immune response. It has also been shown to be an essential tissue for the construction of an afferent urinary conduit in persons with neurogenic bladder. In a study, it was observed that removal of the appendix at infancy had little or no detrimental physiologic effect and individuals with congenital absence of the appendix have shown no obvious deleterious features when compared with those that possessed an appendix. Conversely, the appendix is notorious for the life threatening complications of perforation in inflammation. The often narrowed entrance to this vestigial structure makes it prone to physical blockage which ultimately may result in appendicitis. Mounting evidence suggest that it may also be implicated in inflammatory bowel disease of the colon portraying the appendix as a maladaptive structure prone to inflammation arising from its lymphoid features and neoplasia, albeit rare.

Infections have been linked with appendicitis the suggesting that local invasion could trigger appendicitis. Several viral infections (Alder, et al., 2010; Boon-Siang, et. al., 2006; Livingston, et. al., 2007; Thalayasingam, 1985) and bacteria such as Campylobacter, Brucella and Salmonella (Campbell LK et al., 2006;
Lesions of the appendix are common. The appendix is however exposed to other uncommon but deleterious lesions which if not detected early and prompt attention given immediately may result in morbidity and mortality.

Jones et al., (2007), United Kingdom recorded that of the 1225 reports examined in a study, forty six (46) showed incidental / unusual findings. While 11 of these revealed intraluminal parasites, three showed endometrosis and 6, Crohn’s disease. 23 had features in keeping with benign tumours or tumour like conditions while three cases of malignant tumours were identified.

In a study in Hongkong, Wchen, 1987, showed that in 180 entries for unusual pathologies of the appendix, chronic granulomatous lesions accounted for 27 of the cases. Parasitic lesions were observed in 58 cases with 26 of this number being enterobiosis, 20 cases of schistosomiasis, six cases, trichuriasis, five cases of ascariasis and one case of clonorchiasis. He further recorded that there were 26 mucoceles, one hyperplastic polyp, three adenomas, six mucinous cystadenomas, 11 carcinoid tumours, two leiomyomas and one neurona. Seven cases of primary adenocarcinoma of the appendix and 25 cases of carcinomatous spread were also observed. In this series also were two cases of malignant lymphoma and one case of lymphoblastic leukaemia infiltration. Endometriosis was found in nine cases and one appendix was discovered to have hirschprungs’ disease. The results in India ascribed four (1.2%) of the unusual lesions to neoplasms (adenocarcinoma and carcinoids) while mucocele accounted for two (0.6%) of the observed pathologies. Tuberculosis with enterobiosis vermicularis were found to be responsible for one (0.3%) of the lesions while xanthogranulomatous appendicitis was found in one case (0.3%) (Gethal et. al., 2012).

Out of the 5262 appendectomies reviewed by Akbulut et al., (2011) in Saudi Arabia, 54 (1%) specimens showed incidental unusual/abnormal histologic findings. Thirty of the respondents were male while the rest were female with age range of 15 to 84 years (median; 32.2 ± 15.1 years). Thirty seven of the patients were observed to have enterobius vermicularis, five had carcinoid tumour, six observations of mucinous cyst adenoma were made, and two each with tuberculosis, eosinophilic infiltration, goblet cell carcinoid and neurogenic hyperplasia were also made.

Similarly, Almulhim (2010) reported that of the 1324 cases of appendectomies over a two year period, 45 were shown to be unusual findings. Parasites were responsible for 21 cases, Crohn’s disease, nine, and Carcinoids, five. Endometriosis and adenocarcinoma were shown to account for one case each.

Only 3.4 % of the 408 patients analysed at a South African study showed parasitic infestation. The remaining unusual findings constituted only 0.49 % (2) of the entire population studied (Muthuphei and Morwamoche, 1998).

Ojo and Odesanmi (1991) observed 33 cases which they classified as miscellaneous in their study.17 of these cases were composed of intraluminal ova of parasites with phlegmonous eosinophilic infiltration of the appendix (5.4%) while toxoplasmosis induced appendicitis was observed in five cases. Carcinoid tumour was diagnosed in three cases (0.95%) two of which the tumour had spread beyond the appendix.

The aim of this study was to determine the pattern of unusual histologic findings of the appendix following appendectomy and to compare the findings with previous domestic and international studies. The results are expected to sensitize health personnel and the general public of the strong requirement for histologic review of all appendix specimens after appendectomy.

MATERIALS AND METHODS
This was a retrospective study conducted at the University of Benin Teaching Hospital, a tertiary health facility which sub serves a considerable part of the south- south region of Nigeria. The period of study was between 2001 and 2010 (ten years). Records were obtained from the archives of the Histopathology Department and
permission was obtained from the institution’s ethics and research committee (Protocol number; ADM/E22/A/VOLVII/742). Demographic data including sex, and age were obtained from the records unit of the institution. Results were presented in frequency.

RESULTS
A total of 1171 samples were analysed out of which 17 were miscellaneous findings. This included 7 diagnosed for chronic granulomatous infection predominantly of male gender, 4. Most cases were within the 11-20 age group and the ages involved ranged from 11 and 70 years (Table 1).

Parasitic infestations were observed in only two female and 1 male cases. The age range was between 21 and 50 years. One case each was seen in carcinoid, intestinal necrosis, intestinal infarction, chronic HPV, haemorrhagic appendix (which was found in a patient aged between 70 and 80 years).

DISCUSSION
Out of the 1171 appendix samples analysed during the period of study, only 17 were designated miscellaneous majority of which were of the chronic granulomatous (CGI) variety. This finding was similar to that by Wchan, 1987 in Hong Kong who opined that this may have arisen from the predominance of tuberculosis in that region unlike in western countries were Crohn’s disease was a more likely cause of CGI. Similarly, Ojo et. al., 1991 showed that 4 cases (2.7%) of the appendectomies were of the CGI variety further indicating that CGI was not uncommon in some countries (Zulfikar et. al., 2009). This is likely the result of poor hygiene and further decline in living standards in the area under study (Baker, 1985). Several individuals may actually be living below the poverty line with resultant exposure to these parasites which may eventually result in appendicitis.

Parasitic infestations are not uncommon in this part of the world. This study revealed that it occurred in the appendix in some cases following histopathologic review of the appendix. The specific parasites in this series were both Schistosomiasis mansoni and S haematobium which was not far different from the observation in Kano, Nigeria, were this condition is endemic. Again, poor hygiene and living standards can explain these findings which may result in chronic inflammatory change.

The incidence of Carcinoid tumour in this study (0.085%) was like the observation in Hong Kong by Wchan (1986) (0.088%- 0.096%) and 0.09% in Saudi Arabia (Akbulut et. al.,2011) unlike was observed earlier in Ife-Nigeria (Ojo and Odesanmi 1991), Pakistan (Zulfikar et. al.,2009) and Akbulut et. al., 2011) in Turkey. Some have noted that sampling technique might have been responsible for the low yields of Carcinoid tumours which may exist in small foci within the appendix.

This study has shown that of a total of 1171 appendix samples obtained from appendectomies, 17 had unusual findings. This study has further emphasised the need for routine histopathologic analysis of all appendix tissues following appendectomies regardless of the macroscopic appearance.

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Table 1: Miscellaneous findings in appendectomies

| Lesion                  | Age   | Male (f) | Female (f) | Total (f) |
|-------------------------|-------|----------|------------|-----------|
| *CGI                    | 0-10  |          |            |           |
|                         | 11-20 | 1        | 2          | 3         |
|                         | 21-30 |          |            |           |
|                         | 31-40 | 1        | 1          | 2         |
|                         | 41-50 |          |            |           |
|                         | 51-60 | 1        |            | 1         |
|                         | 61-70 | 1        |            | 1         |
|                         | 71-80 |          |            |           |
| Parasitic disease       | 21-30 |          | 1          | 1         |
|                         | 31-40 |          | 1          | 1         |
|                         | 41-50 |          |            |           |
| Carcinoid tumour        | 51-60 | 1        |            | 1         |
| Intestinal necrosis     | 21-30 |          |            | 1         |
| Intestinal infarction   | 31-40 |          | 1          | 1         |
| Chronic HPV             | 41-50 |          | 1          | 1         |
| Haemorrhagic necrosis   | 51-60 |          |            | 1         |
| Chronic obliteration    | 61-70 |          |            | 1         |
| Atopic appendix         | 71-80 | 1        |            | 1         |
| Total                   |       |          |            | 17        |

*CGI; chronic granulomatous inflammation

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