

## **Research Article**

### **A Physiological Approach to Manage Ingrown Toe Nails**

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**Abstract:** Ingrown toe nails whose synonyms are Onychocryptosis, Unguis incarnatus, and embedded toe nails are largely a disease of civilized society. The condition is rare in societies where shoe wearing is not common or who make their own. The numerous methods used for treating embedded toe nail are testimony to the lack of generally acceptable procedure with a low failure rate. There is paucity of local publication on this disease entity. The study is a hospital based case series of 55 patient that were treated for embedded toenail in LAUTECH Teaching Hospitals between year January 2009 and December 2012. The age and sex distributions we found in this study are similar to that found by other workers and support the contention that embedded toe nails is predominantly a disease of young males. By combining wedge resection of the nail fold with either partial matrixectomy or nail ablation, we recorded 99% cure rate, which by far surpasses all the traditional methods.

**Keywords:** Ingrown toe nails, Embedded toe nails, Wedge resection of the nail fold, Partial matrixectomy.

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#### **INTRODUCTION**

Ingrown toe nails whose synonyms are Onychocryptosis, Unguis incarnatus, and embedded toe nails are largely a disease of civilized society. The condition is rare in societies where shoe wearing is not common or who make their own. The increasingly common use of manmade fibres in socks and of plastic materials in shoes adds to the problem [1].

Embedded toe nails is a fairly common condition with an estimated 10,000 new cases presenting in the U.K each year [2] and it usually affects the big toe [3]. Though the exact incidence in the general population is not known, Wallace and Andrew estimated and approximated annual incidence of 1 per 1000 of the population in the Newcastle area of England [4].

This condition predominantly affects young people with 85% of cases occurring in people aged between 9 and 29 years [5], and approximately two thirds of patients are male [6].

Factors implicated in the Pathogenesis of the embedded toe nail include external pressure on the nail wall caused by either too narrow shoe toe box or too small a shoes and improper trimming of the toe nails.

Sweat, dirt and tropic effect of hormones on the nail wall of the toe are also possible aetiological factors [9].

The extrinsic pressure causes the nail fold to push into the sharp edge of an improperly cut nails breaking the skin. The bacterial and fungal flora on the skin enters and inflammation results. A bottle-necked, poorly draining abscess follow [8], causing erythema, edema, hyper hidrosis and tenderness. Hypertrophic granulation tissue completes the clinical picture of the familiar infected embedded toe nail.

Three stages of the embedded toe nail described by Heifetz, Zainas and Dixon are: stage I which is the inflammatory stage' stage II which is the stage of abscess formation and stage III which is the stage of granulation formation [17].

The numerous methods used for treating embedded toe nail are a testimony to the lack of generally acceptable procedure with a low failure rate [6,10]. For example simple avulsion of the nail has an unacceptably high recurrence rate of between 70 and 86% [6]. Zadik operation [12] has a reported symptomatic recurrence rate of between 16 and 33% [4, 6, 7].

Phenol cauterization of the nail germinating tissue [11, 13] has a reported are rate of 97% in one study [1,11,13]. This method is however not in use in our center.

Vandenbos and Bowers following their work on embedded toe nail concluded that a more physiologically sound description of the embedded toe nail is overgrown toe skin [13, 15, 16]. According to them the nail is not the problem but the excess soft tissue, and this should be the target of the excision not the nail [13, 14, 16].

A comparison of toe nails of healthy controls and patients with embedded toe nails has been found to be similar with no difference whatsoever [13,15] .

We are prompted to embark on this hospital based case series because of paucity of local report on embedded toe nails and to document aetiological and predisposing factors in this environment and to compare outcome of physiological based care ( Modified Bartlett technique) with the traditional care as reported in the literatures.

#### **PATIENT AND METHODS**

We obtained an informed consent from all the patients recruited into the study. Ethical clearance was obtained from the Ethical committee of the hospital where the patients were care for.

We designed profoma to extract the information at the first contact with the patients referred to the Orthopedic unit of Ladoke Akintola University of Technology Teaching Hospital ogbomoso, with a diagnosis of embedded toenail. The information extracted included Hospital number, age, sex, occupation, affected foot, affected nail fold, stage at presentation (Heifetz staging), shoe that was commonly worn for most part of the day, nail trimming techniques, treatment offered, length of follow-up, complication of chosen treatment modality and patient satisfaction at the end of 1 year.

We took photographs of the feet of all the patient, and collected the Mobile phone numbers of all the patients.

We took a swab of all suppurating lesions and we sent the specimens for microscopy, culture and sensitivity (MCS). We administered topical antibiotics based on the MCS outcome. We also carried out urinalysis in all the patients.

We treated all the patients according to the protocol based on the Heifetz staging and recurrence status.

#### **RESULTS**

A total of 72 patients were attended to within a period of 4 years, of these we were able to follow up 55 patients for up to 1 year and we based the case series on this number. Mobile telephone numbers were invaluable to achieve this and our findings are as follows:

Sex distribution Male 37(67.27%) and Female 18(32.72%)

Age range was 16 years- 45 years and the mean age was 26.45 years (table 1).

Students and white collar jobbers were found to account for 98.28% of the patients studied. Twelve patients had both halluces nail involved, while 43 patients had one hallux involved making 67 halluces in all. Out of the 55 patients, the right big toe was involved in 47 patients (85.5%) and the left big toes in 20 patients (14.5%). Of the 67 halluces, the lateral nail fold only was affected in 34 halluces(50.75%), medial nail fold in 12 halluces 17.9%, while both lateral and medial nail folds were affected in 21 halluces 31.34% (table 2).

Forty-one patients (74.54%) normally used razor blades to trim their nails while 14(25.45%) normally used files. Only 10 (18.18%) patients, all working class females, employed the services of 'podiatrists' to trim their toenails, while the remaining 45(81.82%) trim their toenails themselves.

The Heifetz stages of the 67 embedded nails at presentation were as follows: 48(71.64%) fell into stages ii and iii, 15 halluces (22.39%) were stage I. All stage I lesions had non operative management modalities which entailed wearing shoes with open toe box, and toe nail trimming education i.e. filling the toe nail squarely. Compliance rate was poor and recurrence rate of 50% at 1 year of follow up was recorded. We subsequently carried out partial matrixectomy plus wedge resection of the nail fold in 7 of the Halluces with no recurrence after one year of follow-up.

We carried out wedge resection of either or both medial and lateral toe nails folds plus partial matrixectomy in all the patients with stage II and III lesions, only 2 of the 63 Halluces suffered recurrence within 1 year and were re operated with no recurrence thereafter.

Fig. 1-4, are the clinical photographs of a stage II lesion, nail fold and matrixectomy, immediate post operative appearance and follow up picture at one year post operatively.

The recurrence rate of Zero percent was reported after 1 year of follow up. Patient satisfaction was excellent at the end of one year.

**Table 1: Frequency Distribution**

| Age in years | Distribution | Percentage |
|--------------|--------------|------------|
| 0-5          | 0            | 0%         |
| 6-10         | 0            | 0%         |
| 11-15        | 0            | 0%         |
| 16-20        | 8            | 14.5%      |
| 21-25        | 19           | 34.5%      |
| 26-30        | 22           | 40.0%      |
| 31-35        | 4            | 7.3%       |
| 36-40        | 1            | 1.8%       |
| 41-45        | 1            | 1.8%       |

**Table 2: Lesion site distribution**

| Site of Disease   | Patient number | Percentage |
|-------------------|----------------|------------|
| Single hallux     | 43             | 78.2%      |
| Both halluces     | 12             | 21.8%      |
| Both nail folds   | 21             | 31.3%      |
| Lateral fold only | 30             | 44.8%      |
| SMedial fold only | 16             | 23.9%      |



**Fig. 1: Stage III embedded toe nail**



**Fig. 2: Intra operative wedge resection of the nail fold**



**Fig. 3: Immediate post operation**



**Fig. 4: Follow up picture at 1 year**

**DISCUSSION**

The age and sex distributions we found in this study are similar to the findings by other workers and support the contention that embedded toe nails is predominantly a disease of young males [5-7].

The preponderance involvements of the lateral aspects of toe nails 82.9% of the 67 feet lend credence to the external pressure theory. Both halluces being affected in 21.82% in this study is similar to findings by J.H Twedie and Range [10]. We postulated that since Right upper limb and lower limb are better developed in the right handed people and vice versa, hence right foot is expected to be bigger than the left. The foot-room available for the right toes is relatively smaller compare to the non- dominant foot and hence more pressure is exerted on the lateral fold by the shoe. This postulation explains the predominance of the right big toe affectation.

Most traditional methods available for treating embedded toe nails are generally unsatisfactory [6, 10]. Angular phenolisation with a 97% cure rate reported in one study [1, 11, 13] seems to be the best modality of treatment in literature. This is not yet in use in this centre. The recurrence rates of 50% for non-operative management, 14.58% for Zadik operation, 6.67% for total nail ablation + matrixectomy at 1 year made these operative methods less desirable. 12 months for follow up is found in the literature to be adequate for assessing treatment of embedded toe nails.

By combining wedge resection of the nail fold with either partial matrixectomy or nail ablation, we recorded 99% cure rate, which by far surpasses all the traditional methods. This cure rate is only comparable to phenol cauterization of 97% cure rate to findings of other workers [6, 7, 12]. Use of razor blades as self care of the toe nails are a common habit in this part of the world, coupled with rarity of young men visiting saloon for the purpose of manicure.

**CONCLUSION**

Embedded toe nail is a fairly common problem in this environment but poorly studied. Young males with preference for closed toe box shoe are predominantly affected [5]. Outcome of the most treatment procedures are unsatisfactory [6] but angular

phenolisation has a good prospect [1, 11, 13] and combination of wedge resection of nail fold plus either partial matrixectomy or total nail ablation as found in this study has a good prospect.

Further studies with a larger sample size will be needed to corroborate this findings.

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