

Thyroid Surgery in Burkina Faso, West Africa: Experience from a Surgical Help Program

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Abstract

Background Endemic goiter caused by iodine deficiency is still very common in sub-Saharan Africa and is a surgical challenge because of the often large size of the goiters.

Methods A retrospective analysis was made of patients who underwent operation for thyroid diseases during a surgical help program in Leo/Burkina Faso during a 7-year period from 2001 to 2008.

Results A total of 253 cases presented with goiters grade III (WHO classification) were operated on: 134 hemithyroidectomies, 108 hemithyroidectomies combined with subtotal contralateral resection, and 11 total thyroidectomies were performed. The recurrent laryngeal injury rate was 0.8%, and the re-exploration rate for bleeding was 1.2%. Median hospital stay was 3.1 days. Histological examinations showed Graves' disease in 6 cases, and multinodular goiter in 231 cases. Follicular cancer was found in 15 cases, and anaplastic carcinoma was found in 1 case.

Conclusions Thyroid surgery can be performed with low complication rates under basic surgical conditions. Because of the size and pathology of the goiters, total thyroidectomy is the method of choice. However, considering the risk of the development of hypothyroidism due to poor understanding or difficult access to medication, a limited

resection, e.g., hemithyroidectomy, is the most optimal operative strategy.

Introduction

The prevalence of large goiters caused by iodine deficiency is widespread and continues to remain an endemic health problem in sub-Saharan Africa. In 2001, a surgical help program was founded by the Diakonie Hospital Mannheim, Germany (Teaching Hospital for the University of Heidelberg) and the "Hopital de Leo," Burkina Faso. This partnership enables two complete operation teams to work in Leo for a 10-day period annually, mainly performing thyroid surgeries. We report our surgical challenges and experiences with this project.

Materials and methods

This retrospective study includes patients who underwent surgery for thyroid diseases during a surgical help program in Leo/Burkina Faso during a 7-year period from 2001 to 2008.

The initial diagnosis was based on clinical evaluation performed by the local staff during the year. The selected patients were examined at the beginning of each yearly visit by German surgeons experienced in endocrine surgery. Because ultrasound, thyroid scans, and thyroid function tests were not available, only grade III goiters were elected for operation. Patients showing clinical signs of hyperthyroidism were operated under general anesthesia after a 3-day preparation period with beta-blockers (Propranolol). Before surgery, blood samples were taken from

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each patient, and thyroid function tests were performed retrospectively from Germany after the operation. A histological examination was performed on each resected thyroid tissue.

The surgical standard therapy was thyroidectomy, hemithyroidectomy, or subtotal thyroidectomy, depending on the clinical grade, local pathology, and postoperative availability of treatment with thyroxine. To avoid a paralysis of the external branch of the superior laryngeal nerve, the superior pole vessels were dissected adjacent to the capsula, while the recurrent laryngeal nerve was always identified in its entirety. Skin closure was performed with a resorbable running suture (Monocryl 4-0®); a drain was not used. Two days after surgery, an indirect laryngoscopy was performed to ensure recurrent laryngeal nerve function.

Daily clinical examinations were performed regarding hypocalcemic symptoms, such as perioral numbness, tingling, or clinical signs, such as Trousseau's or Chvostek's, to compensate for the lack of laboratory testing. Surgical therapy, complications, and length of hospital stay were assessed in addition to histological examination and preoperative thyroid function.

Results

A total of 253 patients (42 men and 211 women) were identified in this retrospective study, all of whom were afflicted with grade III goiters (WHO classification). The age of the patients ranged from 21 to 73 (median, 48.25) years. Of these, 236 patients showed normal laboratory parameters of thyroid gland function with normal thyrotropin (TSH) stimulation preoperatively. Seventeen patients showed hyperthyroidism, including patients with Graves' disease ($n = 6$) and toxic multinodular goiter ($n = 11$). Eight of these 17 patients had clinical symptoms of hyperthyroidism. There were no patients with hypothyroidism. A total of 134 patients had unilateral nodules (Fig. 1) and, in 113 patients, the thyroid nodules were located bilaterally (Fig. 2). In total, 134 hemithyroidectomies, 108 hemithyroidectomies combined with subtotal contralateral resection, and 11 total thyroidectomies were performed.

Two patients (0.8%) showed unilateral recurrent laryngeal injury 2 days after surgery (both after total thyroidectomy), three patients (1.3%) needed a re-exploration for bleeding, and seven patients (2.8%) showed clinical symptoms of hypoparathyroidism, which could be treated by oral calcium substitution. None of the patients were found to have a tracheomalacia. Median hospital stay was 3.1 (range, 1–5) days. There was no early wound infection.



Fig. 1 Patient with large unilateral goiter

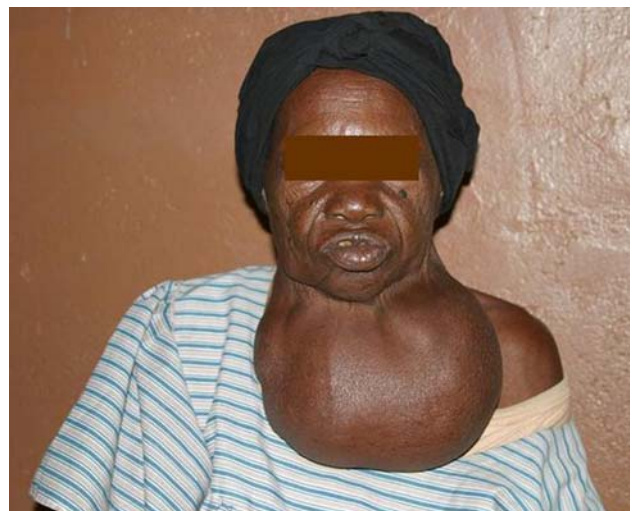


Fig. 2 Patient with large bilateral goiter

Histological examination revealed Graves' disease in 6 cases and multinodular goiters in 231 cases. Follicular cancer was found in 15 cases, and anaplastic carcinoma in 1 case.

Discussion

The development of endemic goiter as a result of iodine deficiency remains a major global health issue. It is estimated that 740 million people worldwide are afflicted with goiters, and 130 countries are affected by iodine deficiency [1]. It is widely recognized that iodine deficiency plays a

primary role in the evolution of goitrogenesis, and the prevention and treatment of endemic goiter by iodine supplement is largely accepted within the medical community. By definition, a zone is endemic for iodine deficiency if 5% of the general population and >10% of school-age children in that area are deficient [2].

During the last decade, there has been substantial progress toward the elimination of iodine deficiency, although not enough for it to be no longer considered a significant global medical problem. The initiation of universal salt iodization programs has helped to alleviate the endemic [3], but it is especially challenging, technically as well as socioeconomically, to implement such iodine prophylaxis programs in developing countries, where the problem of iodine deficiency is most widespread [4]. Naturally with the consideration of these challenges, thyroid surgery continues to represent a small but significant portion of major elective general surgery within the developing world [5]. For example, within the region of sub-Saharan Africa, 43% of women and 26.1% of men are reported in the literature to be afflicted with goiters in Togo [6], and 55.2% of people up to aged 45 years in Burkina Faso [7].

Goiters caused by iodine deficiency are typically multinodular and of a significantly large size, producing signs of compression that requires surgery. Unfortunately, most of these goiters afflict people in areas with substandard medical and surgical facilities [4].

Our study took place in the District Hospital, Leo/Burkina Faso. In this facility, the local medical staff consists of two doctors who were given only 5 months of rapid training in gynecology and surgery directly after completing their university studies. They are responsible for the medical, gynecological, and surgical departments within the hospital. Because medical insurance is rarely available in Burkina Faso, most patients must pay for all medical expenses unassisted. Because of the poor income of most families, medical treatment often is not sought before the illness has reached an emergency status, and elective patients normally present themselves with advanced and complicated diseases. The possibility to perform thyroid surgery in Leo routinely does not exist—because the surgeons are not adequately trained, or because the patients do not have enough money to pay for such an operation. Therefore, in Leo the surgical management of thyroid disease still presents a challenge.

Because surgery was limited to grade III goiters showing symptoms of mechanical obstruction and compression (difficulty breathing, stridor, hoarseness, and dysphagia), our surgical results and pathology specimens must be considered in respect to our selection. The malignancy rate of 6% in multinodular goiters was significantly lower than what has previously been reported in sub-Saharan Africa (13–20%) [8]. Our results were consistent with the fact that

follicular cancers are considered to be the most common in sub-Saharan Africa [7, 9], given that we did not see any papillary cancer in our series.

Although iodine deficiency and increased TSH stimulation are maintained as the main contributors to goiters in sub-Saharan Africa, our finding of thyroid gland function to be normal in most cases suggests that these are not the only causing factors. For instance, there is epidemiological and experimental evidence that the concomitant exposure to a cyanogenic glucoside (linamarin) from Cassava significantly increases the severity of the goiter endemia in the presence of iodine deficiency [4, 10]. Additionally, if vitamin A is supplemented during childhood, excess TSH stimulation is decreased and therefore the risk of goiter development in iodine-deficient African children is reduced [11].

We reported eight cases of thyrotoxicosis in our patient-population, which is consistent with previous literature reporting this disease to be uncommon although slowly increasing in sub-Saharan Africa [12].

Interestingly, retrosternal enlargement was only seen once in our series aside from the fact that the thyroid gland typically enlarges itself in the neck region, facilitating the surgical procedure. This finding also contributes to the lack of tracheomalacia in our series, contrary to the report that patients with longstanding large goiter are more prone to it [13].

In the developed world, total thyroidectomy is the preferred surgical treatment for multinodular goiters. It is proven that this procedure can be performed with excellent long- and short-term results. The rate of permanent recurrent laryngeal injury after total thyroidectomy should be <2%, permanent hypoparathyroidism <5%, and postoperative bleeding 1–2% [14]. It is expected that these parameters are met when performing total thyroidectomy, even in adverse circumstances. Our results show that these goals can be achieved with minimal technology and resources and prove that a well-trained and experienced staff operating with basic equipment can overcome the challenges of surgery in sub-Saharan Africa.

It has been shown in the endemic regions that total thyroidectomy is the treatment of choice for multinodular goiters if patients have no identifiable normal thyroid tissue [15]. In many instances, aggressive management of malignancy and toxicity also can be achieved by means of total thyroidectomy as primary therapy [1].

The recent trend in the developed world to perform total (rather than subtotal) thyroidectomies for multinodular goiter may not be applicable where thyroxine supplies are likely to be inconsistent and unreliable [16]. Subtotal thyroidectomy may be the best option for patients whose access to thyroxine is likely to be intermittent [17]. However, it is not easy to assess the risk of the development of

hypothyroidism due to poor understanding or difficult access to medication versus that of recurrence with a more limited resection. The recommendation of both individualized and aggressive management of multinodular goiter seems to be conflicting, and reflects the dilemma in the recommendation of the most optimal operative strategy.

This dilemma also exists in our series. Patient compliance and understanding often is unreliable, as is the access to postoperative medication. Because our team is only onsite for 2 weeks annually in Burkina Faso, we feel a great responsibility not to perform a surgical overtreatment that may result in hypothyroidism. On the other hand, the symptoms of mechanical obstruction and compression require surgical help.

Considering all of these factors, we prefer hemithyroidectomy whenever possible. Because most goiters in our series were located unilaterally, this seemed to be the best option. For the surgical-technical management of large goiters, it is much easier to remove the whole lobe than to perform a subtotal resection. In regards to large vessels and virtually unidentifiable normal thyroid tissue, it is much safer and cleaner to prepare the goiter respecting its natural anatomical borderlines rather than subtotal resection margins. Given the poor surgical conditions, such as foot-pump operated suction and unavailability of a blood bank, this technique also is necessary to ensure safety.

For multinodular goiters located bilaterally, a hemithyroidectomy of the larger side is recommended with a subtotal resection of the contralateral side, depending of the size of the goiter and the possibility of the patient to access medication postoperatively. Total thyroidectomy should be performed for extremely large multinodular goiters or in the case of intraoperative suspicion of malignancy. This recommendation is consistent with other authors with experiences in thyroid surgery in the tropics [17].

Unfortunately, follow-up examinations and further study of the occurrence of hypothyroidism were not possible because of the large and increasing referral area of the Hospital de Leo with only rare medical supervision. This makes it difficult to draw a definitive conclusion or recommendation about the practice of a more limited goiter resection.

Conclusions

Our series demonstrates that thyroid surgery is possible with results similar to the standard of the developed world even in the often difficult conditions of a small African District Hospital. Although total thyroidectomy is the authors' method of choice when working in Germany and

has many advantages, especially for advanced thyroid diseases, it is not recommended in every case when working in the developing world, specifically sub-Saharan Africa. Due to the extension of thyroid disease and the uncertainty of the patient to access medication postoperatively, an individually tailored operative strategy should be performed, where hemithyroidectomy is given the highest consideration.

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