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AUTOLOGOUS TRANSFUSION IN SURGICAL PATIENTS AT KENYATTA NATIONAL HOSPITAL, NAIROBI

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ABSTRACT

Objective: To identify autotransfusion strategies and their basis in elective surgery patients.

Design: A cross sectional prospective study.

Setting: General surgery and orthopaedic wards, Kenyatta National Hospital, Nairobi.

Subjects: Adult patients of both sexes planned for elective surgery.

Main outcome measure: For every patient, the following were enquired about and documented: age in years, sex, ethnicity, religion, occupation and educational standard. Blood values of haemoglobin, platelet counts, total and differential white cell counts, urea, electrolytes and liver function tests were assayed. Others were the number of units of blood donated before the operation, the type of surgery performed, time taken from diagnosis to performing the operation and whether the blood was transfused preoperatively, intraoperatively and post-operatively.

Results: A total of sixty three cases constituting five per cent of all surgical patients admitted during the period of study were evaluated. Of these 53 (84%) were males and ten (16%) females. The age range was 15 to 65 years with a peak at 45-49 years. There were more Christians (90%) than Muslims (10%). In all, 32 (51.6%) had primary school education, 23 (36.5%) secondary school education, seven (11.3%) no formal education and one (1.6%) had attained college level. Employment pattern showed 50% were civil servants, 30% were self employed and 20% were unemployed. The duration of disease ranged from 1-24 weeks with two peaks at two weeks and six weeks. Orthopaedic cases constituted 78.7% and general surgery 21.3%. Preoperative haemoglobin ranged from 13.5-14.2 g/dl. Transfusions were given intraoperatively to 41 (66.1%) and to 12 (33.9%) postoperatively. Mean duration of hospitalisation was 13 days (range 5 to 21 days). 98.4% deposited only one unit while 1.6% deposited four units of blood. Only one patient required additional transfusion from homologous donors.

Conclusion: The strategies and basis for autotransfusion have been demonstrated among a majority of adult patients requiring orthopaedic procedures. Major determinants are shown to be baseline blood count profiles and time to operation.

INTRODUCTION

Blood collected from a patient for re-transfusion at a later time into the same individual is called "autologous blood". With the dwindling of, and the risks associated with homologous donor blood, autologous transfusion which is widely endorsed as the safest transfusion practice should be considered for most elective surgical procedures requiring blood transfusion(1,2). Also, in spite of substantial improvements in blood transfusion safety, combined with the increasing emergence of managed care, it is still necessary that all surgeons re-examine autologous transfusion and its ability to provide most transfusions(3,4).

Studies have shown that the age bracket that can benefit is wide. Silvergleid(5) demonstrated that preteens and adolescent children could benefit from this procedure. In their study children aged between 8-18 years, some

weighing as little as 27 kgs were able to predeposit prescribed amounts of blood prior to elective orthopaedic surgery. In addition, major operations such as radical prostatectomy have been demonstrated to benefit with the main restriction being the number of units that can be donated(6-8).

The level of education particularly that of the surgeons and the community has been demonstrated to enhance the use and the effectiveness of autologous transfusion practice in some communities(9). Overall, greater use of autodonated blood not only relieves the demand in the blood supply by decreasing the need for homologous transfusion but probably also reduces the risk of such infections like hepatitis and other transfusion associated illness(10). In addition, autologous transfusion has other direct and specific indications: such as prevention of alloimmunisation, providing blood for transfusion for

patients with previous history of severe transfusion reactions due to the presence of antibodies, and stock piling of rare blood types (11,12).

With this background, we investigated the practicability of this procedure in our largest, referral and teaching hospital, the Kenyatta National Hospital (KNH).

MATERIALS AND METHODS

Study population: Elective surgical cases admitted in the general and orthopaedic surgical wards were included. All males and females aged between 16 and 65 years of age whose haemoglobin (Hb) levels were greater than 11 g/dl for females and 12 g/dl for males but less than 16 g/dl and 18 g/dl respectively were selected.

Patients were excluded from the study if they were known or suspected to have a blood disorder, had been transfused in the previous three months and had chronic illnesses, malignancy or haemoglobin levels below 11 g/dl and 12g/dl or above 16g/dl and 18 g/dl for females and males respectively as these levels were considered suspect for anaemia and polycythaemia respectively. The study group consisted of 634 patients admitted at KNH.

Evaluation: Baseline assessment consisted of clinical evaluation including medical history and physical examination. The duration of illness, signs and symptoms such as pallor, jaundice, oedema of the feet, lymph node enlargement were recorded. Venous blood was taken for a full haemogram, erythrocyte sedimentation rate (ERS) and blood film evaluation. Patients were then re-evaluated three days after surgery.

Treatment: Eligible patients were given iron supplements in the form of ferrous sulphate 200 mg per oral three times a day for six weeks starting immediately after the patient was enrolled in the study. All patients were part of an elective theatre list and no specific surgeons or doctors were assigned these cases. Most of the cases received the predeposited blood during the operation. However, a few received their units within 12 hours post-operatively. The discharges followed the routine surgical protocol. Most of these cases were discharged within 5-21 days and post-operative follow up was in the general clinics just like any other surgical cases. Transfusion of the blood depended on the surgeons' evaluation of the amount of blood loss. The post-operative transfusion was to return the predeposited blood to the patients as per the purposes of the donation.

Autologous blood donation procedure: Eligible cases were required to be bled in the usual blood donation manner, one unit of blood at weekly intervals. The sequence of blood donation by the study participants is presented in Table 1.

Table 1

Sequence of blood donation by individual study participants

No. of blood units required	Duration before planned surgery in weeks	Time interval of bleeding in days
1	1	0
2	1	0,7
3	2	0,7,14
4	3	0,7,14,21
5	4	0,7,14,21,28 (day of surgery)

The blood units were collected into A C P D A 1 bags and stored at between 4-6°C in the special storage section labeled Autotransfusion in the blood transfusion unit within the hospital blood bank.

Study design and data analysis: All the cases were consecutively recruited in the study. The primary analysis used proportions and comparisons of vital statistics, number of donated units and divided into type of operation whether general surgery or orthopaedic cases. We simply sought to know if these aspects influenced predepositing of blood for surgery.

Ethical issues: For all the patients, these procedures and intentions were explained and they were required to sign an informed consent form. The research proposal was submitted to the KNH and University of Nairobi Ethical and Research Committee for approval which was granted.

RESULTS

From August 1st 1997 to October 31st 1997, sixty three patients were enrolled for the study. In all, there were 53 (84%) males and 10 (16%) females with a male to female ratio of 5.3:1. The age range was 16-65 years with a median range of 45-49 constituting 21% of cases (Figure 1). Most of the cases, 57 (90%), were Christians while six (10%) were Muslims. The results showed that educational standards attained were as follows: primary 33 (51.6%), secondary 23 (36.5%), no formal education 6 (10.3%) and college level one (1.6%). The duration of illness before seeking medical attention ranged between one month to 60 months with a mode of 24 (28.1%) months (Figure 2). However, the waiting for surgery after diagnosis and schedule ranged between one week and 24 weeks with two modes of two (27.3%) and six (27.3%) weeks.

Figure 1

Distribution of study patients by age groups

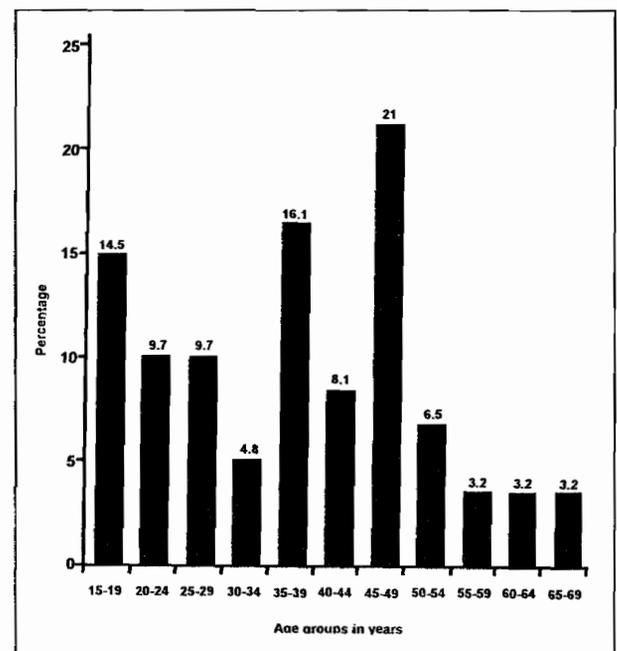
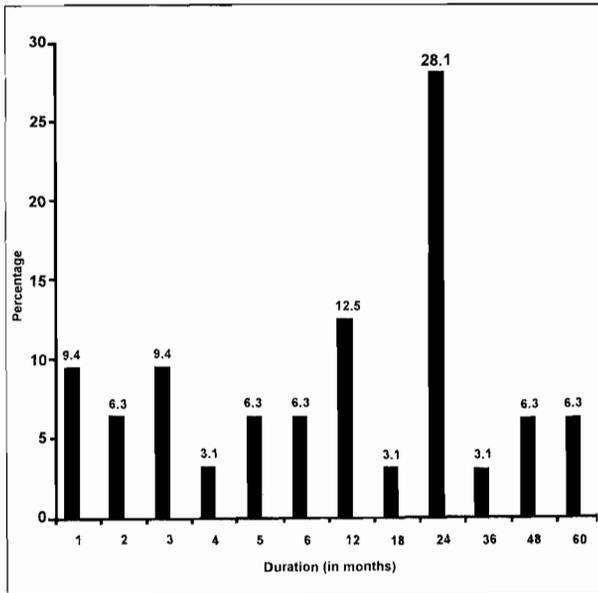


Figure 2

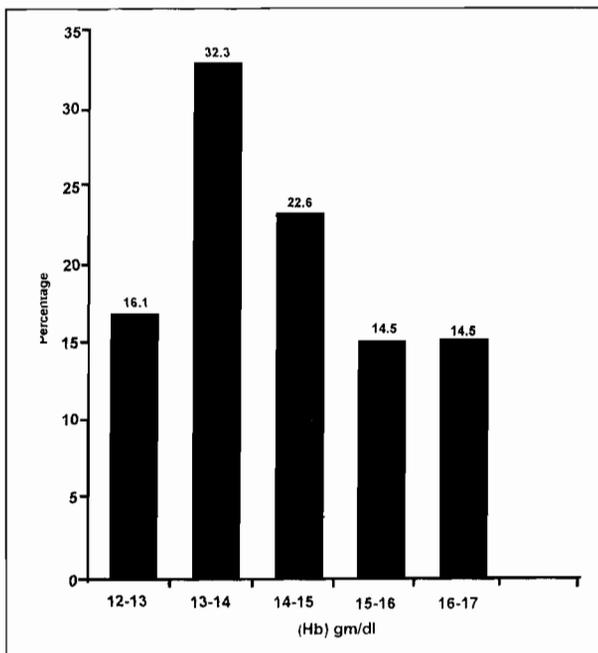
Duration of illness



The salient features of pre-operative blood counts evaluation observed that the haemoglobin (Hb) ranged between 12g/dl and 17.1g/dl, and mode 13.9 g/dl (32.3%). Other features are shown in Figure 3. The distribution of surgical and orthopaedic procedures performed are presented in Figure 4.

Figure 3

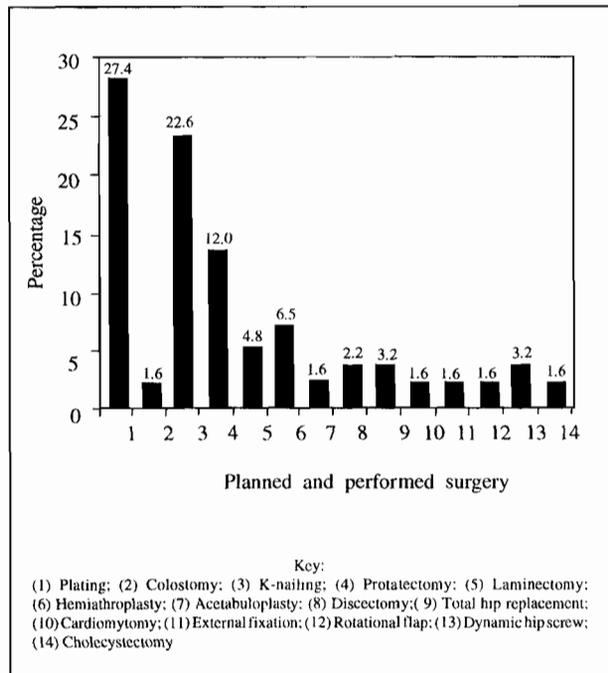
Preoperative haemoglobin levels and the proportion (percentage) of cases



The predeposited blood units were transfused as follows: no cases received blood pre-operatively while 66.1% and 33.9% received intra and post-operative

Figure 4

Surgery performed



transfusion respectively. In all, 96.8% of the patients donated only one unit while 1.6% had two units and 1.6% donated four units.

DISCUSSION

This is the first evaluation of autologous blood transfusion practice in this part of the world. The study shows that autologous blood transfusion is practical in KNH and indeed most of our health institutions. This is so because KNH is the largest referral and teaching hospital in Kenya that sets pace for most of the health practices in the country as a whole. Although the number of cases involved in the present study is small, other studies on autologous transfusion also seem to have involved nearly similar numbers. For example, a study by Wasman and Hoodnough(6) looking at autologous blood donation for elective surgery had 69 cases. Toy *et al*(11) looking at improvement in appropriate autologous donations with local education between 1987 and 1989 showed a progressive increase in the numbers from 44 to 88 and 21 to 32 at two university hospitals. Over the three-month study period, we were able to collect autologous donations from 5% of all the surgical admissions in KNH. This is consistent with Toy *et al*'s(11) cases who had autologous transfusion composing 5% of all surgical cases who actually predeposited blood. Most of our cases (95%), were not legible for autodonation. This is a much higher proportion and suggests that only 5% were saved from homologous transfusions. KNH is a referral centre and mainly complicated cases are referred here. Some of these include

blood disorders, for example anaemia. Indeed reasons for not autodonating were not due to individual or secular characteristics but on advice on clinical grounds. Other investigators have observed the fact that orthopaedic cases were the majority as well(1,14).

The age group of 16-65 years and the peak age of 45-49 years in this study fall in the age bracket of most of our autologous blood donors with orthopaedic post trauma cases. As illustrated in this study, adolescents predeposited blood and were successfully operated on. This confirms Silvergleid's allusion that children could benefit from the practice(2). Some cases older than 60 years were equally successful following a thorough clinical evaluation, as demonstrated in other studies(15,16).

Most of the cases in this study were males, partly because more females than males presented with low Hb and therefore were not legible for preoperative blood deposit. One female patient who did not want homologous blood received four units of her own blood which was collected over four weeks. This particular case had an initial Hb of 6 g/dl three months prior to surgery. She had iron supplements and after two months she was eligible for autodonation.

The faith of the patients did not influence the practice. Our cases of more Christians compared to Muslims was due to the fact that there are more Christians than Muslims in Kenya.

It had been anticipated that educational standards would influence the patients decision to opt for autotransfusion. The results showed that the majority were primary level followed by secondary, no formal education and lastly by college level graduates. This is the pattern observed in Kenya and more so in state run health institutions where the majority of patients are of medium to low educational level. The duration of illness before presenting to KNH of peak 24 weeks followed by 12 months perhaps was due to waiting for availability of homologous blood. In this group of cases, those with benign prostatic enlargement had the longest delay. It was observed that those who had a short duration of stay in the wards had traumatic fractures requiring just plating or external fixation. The waiting period for surgery varied according to the type of disease and the type of injuries and surgery required. Patients who waited for as short as one week were with minor fractures of the femur.

Prostatectomy cases had the longest waiting duration partly due to intervening complications such as infections. Since most procedures required a few units of blood, autodonated unit or units were sufficient with only one case requiring supplementation with two units of homologous blood due to unexpected blood loss during surgery.

In conclusion, the practicality of a pre-operative autologous blood deposit programme based on baseline

haemoglobin levels, the duration of disease and type of operation needed is demonstrated. This spares homologous donor blood for other uses so that some surgical procedures would not have to wait for availability of donor blood. The processes for autologous blood are less rigorous before transfusion than homologous donor blood and fears and risks associated with blood from homologous donors are completely eliminated. In addition, the autologous blood transfusion practice will enhance close working co-operation between the patient, surgeon, haematologist and blood bank staff. We recommend that the programme be encouraged and adopted for most elective surgical procedures.

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