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Original Research Article

Perioperative Management of Anemia in Emergency Abdominal Surgery at the National Hospital of Niamey

Gagara, M[1*], Daddy, H[1], Chaïbou, M. S[1], Danlélé, B[1]

[1]Department of Anesthesia, Niamey National Hospital, G472+5F2, Niamey, Niger

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Abstract: ***Aim of the study*:** To describe the perioperative care of anemia in emergency abdominal surgery in the National Hospital of Niamey. ***Patients and methods*:** This was a prospective and descriptive study that lasted 6months, from June 6th to December 9th, 2020. Were inclueded in the study, all the patients admitted in the department of surgical emergencies who presented acute surgical abdomen associated with anemia. The main studied variables were: age, gender, history, CBC results, American Society of Anesthesiologists score (ASA), indications, etiological diagnosis, incidents and intraoperative accidents, post operative complications, treatment of the anemia, evolution and duration of hospitalization. Statistical analysis of the data was done using SPSS version 25, graphics and data entry were done with Word and Excel 2016 softaware. The average values were calculated for each variable for each patient and examinated by the chi² test for qualitative variables. P value < 0,05 was considered as significant. ***Results***: Our study involved 147 patients out of 581 admissions, i.e a frequency of 25.30%. the average age of the patients was 16.27 years with extremes of 2 and 70 years, the male gender predominated with 64.63% (n=95) and a sex ratio of 1.83. The main preoperative diagnosis was acute peritonitis in 78.91% f cases (n=120) and peritonitis by ileal perforation was the first etiology with 63.94% (n=94). The majority of our patients had moderate preoperative anemia in 73.47% (n=108) and severe anemia in 21.09% (n=31) of cases. The management of anemia was based on blood transfusion which was performed in 10.20% of cases (n=15) preoperatively and 32.65% of cases (n=48) intraoperatively. In the postoperative period, the treatment of anemia was essentially based on oral iron supplementation. Intra operative incidents and accidents were significantly associated with the severity of anemia preoperatively. Parietal suppuration was the main postoperative complication, ie 70.6% (n=48), it was also significantly associated with the severity of preoperative (p= 0.002) and postoperative (p= 0.005) anemia. The average duration of hospitalization was 11.14 days with extremes of 2 and 59 days. The evolution was favorable in 89.80% of cases (n=132), the overall mortality rate was 10.20% (n=15). This mortality was significantly associated with severe anemia and postoperative blood tranfusion with respectively P= 0.012; P= 0.005.

Keywords: Anesthesia, anemia, abdominal emergency, National Hospital of Niamey, Niger Republic.

INTRODUCTION

Anemia is a situation that is regularly incountered in anesthesia during the perioperative period, in the ICU. It is characterized by a drop in the level of hemoglobin (Hb) in the blood below 12g/dl in women and 13g/dl in men according to the definition of WHO. Anemia is said to be mild in women when Hb 110-119g/L and in men if Hb 100-120g/L; moderate in women and in men when Hb 80-109g/L; and severe in women and men when Hb<8g/L [1].

Anemia is a frequent situation and concern about 10% of the population. In elderly patients, patients with kidney failure, chronic heart diseases or cancer, the percentage of anemia patients can reach up to 80% [2].

***Corresponding Author:** Gagara, M
Department of Anesthesia, Niamey National Hospital, G472+5F2, Niamey, Niger

The management of anemia around the surgical period is a challenge for the anesthesists in charge of the patients. The cornerstone of the management of anemia involves the transfusion decision even though the current trend is to use red blood cell transfusion as little as possible for pharmacoeconomic reasons, but also for availability and infectious complications. The trend is part of a logic cultural distrust of transfusion and complications associated with it following the work of TRICC (Transfusion Triggers in Critical Care) group of Hebert and col [3].

The results, recently analyzed, of the French survey on perioperative mortality balance this distrust by revealing that a significant part (about a quater) of this mortality comes from a partial imputability to the poor management of anemia/haemorrhage [4]. The use of alternatives to transfusion, available today, and a better definition of transfusion decision-making tools could make it possible to significantly reduce the frequency of transfusions while better respecting, when it arises, the need of transfusion [4].

PATIENTS AND METHODS

This was a prospective descriptive study ranging from June 6th to December 20th, 2020 ie 6months. Were inclueded in the study, all the patients admitted in the department of surgical emergencies who presented acute surgical abdomen associated with anemia. The studied variables were: age, gender, history, CBC results, American Society of Anesthesiologists score (ASA), indications, etiological diagnosis, incidents and intraoperative accidents, post operative complications, treatment of the anemia, evolution and duration of hospitalization. Statistical analysis of the data was done using SPSS version 25, graphics and data entry were done with Word and Excel 2016 softaware. The average value were calculated for each variable and for each patient and examinated by the chi² test for qualitative variables. P value < 0,05 was considered as significant.

RESULTS

In our study, 581 patients were admitted for acute surgical abdomen, of which 147 presented preoperative anemia, ie a frequency of 25.30%. The average age was 16.27 years, with extremes of 2 and 70 years; the age group from 0 to 15years was the most represented, ie 62.59% (Fig 1). The male gender was predominant with 64.63%, a sex ratio of 1.83. In our study, 3 patients out of 147 (2.04%) had a medical history (2cases of drug allergy and 1case SS sickle cell anemia) and no patient had a history of surgery, transfusion or bleeding. Patients classified ASAI represented 4.76% of cases (n=7), ASA2 83% (n=122), ASA3 10.20% (n=15), ASA4 2.04% (n=3). Peritonitis was the main preoperative diagnosis, 78.91%. The results of perioperative blood count showed moderate anemia in the majority of cases 73.47% (n=108) (Table 1); The O rhesus positive blood group was the majority with 52.38% (n=77). Fifteen patients had benefited from a blood transfusion preoperatively, ie 10.20%. Balanced general anesthesia was performed in all patients. Peroperatively, 48 patients had been transfused, ie 32.65% of cases; intraoperative incidents and accidents were dominated by tachycardia in 40.81% (Table II). The etiological diagnosis was dominated by peritonitis by ileal perforation in 63.94% of cases. During the postoperative period, the blood count showed moderate anemia in 71.32% (table I). Postoperative transfusion was performed in 16.08% of cases (n=23) and treatment with oral iron in 33.56% (n=48). Parietal suppuration was the most common postoperative complication, 70.6%. The average duration of hospitalization was 11.14 days with extremes of 2 and 59 days. In our study, 132 patients were discharged from the hospital, ie 89.80%, the deaths concerned 15patients (4 deaths on the operating table and 11 postoperative deaths) ie an overall mortality rate of 10.20%. The causes of death were hypovolemic shock, hypoxia and sepsis. Intraoperative incidents and accidents were more frequently associated withe severe and moderate anemia, this relationship was significant (p= 0.042) (Table II). Deaths were more frequently associated with severe anemia preoperatively (p=0.012) and with post operative blood transfusion (p= 0.005) (Table III). Parietal suppuration was the most common complication in patients with moderate and severe anemia preoperatively (p=0.002) and postoperatively (p= 0.005) (Table IV).

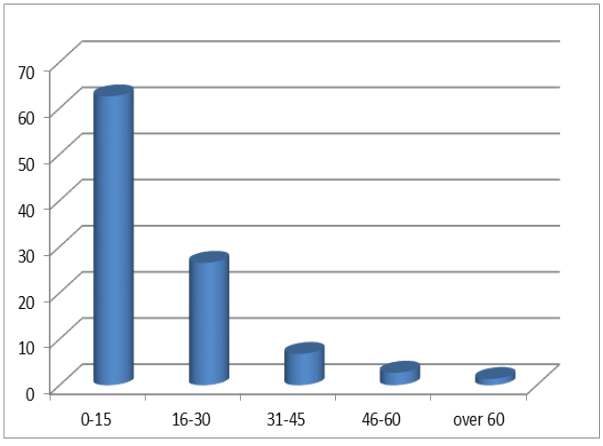

Figure 1: Distribution of patients by age

Table I: distribution of the patients according to the severity of the anemia, preoperatively and postoperatively

Preoperative anemia		
Anemia	**workforce (n)**	**Percentage %**
Mild	8	5.44
Moderate	108	73.47
Severe	31	21.09
Total	**147**	**100.00**
Postoperative anemia		
No anemia	5	3.5
Mild	11	7.70
Moderate	102	71.32
Severe	25	17.48
Total	**143**	**100.00**

Table II: Relationship between anemia and intraoperative incidents/accidents

Type	**Anemia**			**Total**	**P-value**
	Mild	**Moderate**	**Severe**		
Heart attack	5	0	0	5	0.0042
HBP	0	0	1	1	
Hypotension	8	8	2	18	
Bradycardia	1	0	0	1	
Difficult intubation	0	1	0	1	
Tachycardia	16	37	7	60	
Wake-up delay	1	1	0	2	
No accidents	5	50	4	59	

Table III: Relationship between anemia and death; postoperative transfusion and death

Intra operative anemia	**Death**		**Total**	**P-value**
	Yes	No		
Mild	0	8	8	0.012
Moderate	2	106	108	
Severe	13	18	31	
Total	15	132	147	
Postoperative transfusion	5	18	23	0.005

Table IV: Relationship between preoperative anemia and postoperative complications; postoperative anemia and postoperative complications

Postoperative complications	**Preoperative anemia**			**Rate of hemoglobin**	**Total**	**P-value**
	Mild	Moderate	Severe	normal		
Parietal suppuration	1	29	18	0	48	0.002
	Postoperative anemia					
Parietal suppuration	1	22	24	1	48	0.005

DISCUSSION

During our study period, 581 patients had been operated on for emergency abdominal surgery, of whom 147 had preoperative anemia, ie a frequency of 25.30%.

This rate is comparable to that found by Binam and col [5] in Cameroon, who reported 21.6% in their series. However, this rate differs from that found by Owono E and col [6] in Cameroon with 72.5%. This is explained by the fact that the study population of Owono and col was mostly over 65years old and also by the fact that they had considered other non-abdominal pathologies as traumatology cases. Indeed anemia is endemic in our tropical environment outside the surgical context. The surgical condition most often aggrabates a pre-existing anemic state, anemia affects more paediatric and geriatric patients [5, 6].

In our series, the male gender was predominant with 64.63% (n=95), the sex ratio was 1.83. This predominance is widely shared in the literature. Indeed, the pathologies, namely acute intestinal obstruction, appendicits, peritonitis and traumatic abdomens are much more frequent in male gender, men constitute a predilection ground [6, 7].

Patients of all ages had been involved in our study. The average age of our patients was 16.27years with extremes of 2 and 70years. Owono E and col [6] in Cameroon had found an age between 25 days and 79

years. Our results are different from those of Magagi LA and col [8] in Niger who found an average age of 22.91 ± 18.14 years with extremes of 0 and 95years. Indeed, this is a reflection of our demography where the age pyramid is broad based explaining a young population. In the West, on contrary, where the population is aging, we find higher average age [6, 8]. In our series, peritonitis had been the main diagnosis, our results are comparable to those of Adamou H and col [9] in Niger, Magagi LA and col [8] in Niger, Assouto P and col [10] in Benin. Indeed, peritonitis was the most frequently encountered etiology and salmonella is the most mentionned cause, because typhoid fever is rife in an endemo-epidemic state in our regions, as in other developing countries of sub-Saharan Africa [11-14]. In our study, mild anemia was found in 8 patients, ie 5.44%, moderate in 108patients, ie 73.47% and severe anemia in 31patients, ie 21.99%. Our results are comparable to those of Magagi LA and col [8] in Niger who found severe anemia in 137 patients ie 22.03%, moderate anemia in 378patients ie 60.77% and mild anemia in 107 patients ie 17.2%. Anemia was mostly found because peritonitis and intestinal occlusions are anemic pathologies [9, 15, 16].

In our study, most of the patients were classed ASAII, 122 of cases (83%). Our results are different from those of Ibrahima G and col [15] in Senegal who found a predominance of ASAI class in 49,1% of patients. Indeed, this difference is justified in our context by the fact that most often, the patients come to hospital after the failure of a traditional treatment. In addition, initial diagnostic errors are frequent in peripheral health facilities where the first consultations are carried out by non qualified persons. This situation will lead to an alteration of the clinical state of the patients, on an already weakened organism by underlying flaws. Blood transfusion was performed preoperatively in 15 of our patients, ie 10.20%. Our results are different from those of Adamou H and col [9] in Niger who had preoperatively transfused 52patients ie 17% (52/302), Owono E and col [6] in Cameroon with 25 patients ie 18.9%. this difference could be explained on the one hand by the fact that Owono E and col had taken into account other non-abdominal pathologies such as cases of traumatology, and on the other hand by the larger size of the study population in Adamou H and col study. In our study, balanced anesthesia was performed in all patients. Other authors have found a predominance of balanced anesthesia such as Kâ Sall and col [17] and Ouro-Bang Na Maman and col [18] with respectively 76.9% and 71%. This predominance of general anesthesia is a constant and constitutes the only technic in emergency abdominal surgery. Our results differ from those of Ibrahima G and col [15] in whom general anesthesia had been performed in 154 patients (95.6%) and 7 patients (4.4%) had benefited from locoregional anesthesia, such as spinal anesthesia. This difference is explained by the difference in our study population.

In our study, 48patients had been tranfused intraoperatively, ie 32.65%. Several studies have reported intraoperative blood transfusion. Our results differ from those of Magagi I.A and col [8] with 170 patients or 27.33%. This difference is explained by the fact that our study involved patients with anemia. In our series, intraoperative incidents were dominated by tachycardia 40.81% (n=60) followed by hypotension in 12.24% (n= 18). This could be explained on the one hand by the hemodynamic effect of the anesthesic products used, responsible for tachycardia and hypotension coupled with anemia, and on the other hand by the precarious hemodynamic state in abdominal emergencies.

In our series, typhoid ileal perforation was the first etiology of pertonitis ie 63.94% (n=94). Our results are similar with those of Adamou H and col in Niger that found 60.25% of peritonitis by perforation of the small bowel of probable typhoid origin as the first cause of peritonitis. Our results differ from those of Jhobta and col [19] in India and Afridi and col [20] in Pakistan who had found the perfoation of peptic ulcer as the main etiology of peritonitis: Doklestić and col [21] in Serbia also incriminated gastroduodenal ulcer as the main source of secondary peritonitis. . Riché and col [22] in France had found colonic perforation (especially tumor) as the dominant etiology. This difference could be explained by the fact that in our regions, typhoid is rampant in an endemo-epidemic state and often responsible for peritonitis.

Postoperative iron-based anti-anemic treatment was the most used in our series, at 33.56% (n=48). It is important to emphasize that if anemia was frequent preoperatively, affecting 25 to 50% of the patients, it is often more frequent postoperatively, often affecting more than 80% of patients. Postoperatively, a drop in the Hb level is sufficient to indicate martial treatment. In some authors, in surgical context, the most frequent cause of iron deficiency anemia is blood loss. It is the main mechanism of anemia in the postoperative period [20-23].

In our series, postoperative blood transfusion involved 16.08% of patients (n= 23). Anemia is not only a risk factor for mortality, but also for morbidity. Anemia is associated with a plenty of complications, starting with an extension of the duration of hospitalization, an increase in infectious complications but also specific postoperative complications (such as anastomosis release) or non-specific (acute pulmonar edema or heart failure) [23].

In our series, we recorded a discharge rate of 80.90% with an average length of hospital stay of 11.14 days with extremes of 2 and 59days. Magagi L.A and col in his study had found an average hospital stay of 8.71±5.29days, and Adamou H and col had found an average hospital stay of 9days with extremes of 1 and

35 days. The reason could be a delay in consultation of our patients often seen at the stage when complications occur, but also, our study population was made up only of anemic patients which is responsible for postoperative complications. In our series, parietal suppuration was the main complication observed either, 70.6% (n=48), with an overall mortality of 10.20% (n=15). Our results are similar to those of Soro KG and col [26] in Ivory Coast who found an overall mortality of 10.7% (n=15). Many studies had found a very high morbidity and mortality in Africa, most of the studies showed very high rates of morbidity. Our results are different from those of Rasamoelina N and col [27] with a very high mortality ie 37.5% ; Assouto P *et al*., [10] with an overall mortality rate of 13% ; Magagi I.A *et al*., [8] with a postoperative morbidity of 38.10% (n=237), septic complications (n=187) were predominant with an overall letality of 13.67% (n= 85). Adamou H et al [9] had found an overall postoperative morbidity rate of 34.43% (104/302 patients), and an overall death rate of 12%. Our results are also differents of those of Daddy H and col [28] in Niger who had found an overall death rate of 0.68% (n=37); Ibrahima G and col [15] had reported a morbidity of 4.3% et and a mortality of 4.96%.

The African Surgical Outcomes Study (ASOS) showed that patients in Africa were twice as likely to die after surgery than the global average. The incidence of mortality in ASOS was 2.1% and 95% of deaths occured postoperatively [29]. This mortality is around 1 to 5.8% in France and 1.4% in the United States [27]. Several factors could explain it, in particular anemia, the delay in management responsible for the severity of the initial clinical picture, sometimes also surgical treatment and inappropriate antibiotic therapy. In our study, intraoperative incidents and accidents were significantly associated with severe and moderate preoperative anemia (P= 0.042), as well as parietal suppuration associated with moderate and severe preoperative (P= 0.002) and postoperative (P= 0.005) anemia. Anemia was associated with numerous complications in the study of Dunne JR and col [25] which found postoperative specific complications (such as anastomosis release) or non-specific (acute pulmonar edema, cardiac decompensation).

In our series, death was significantly associated with severe anemia (P= 0.012). Several large studies have shown an association between preoperative anemia and increased perioperative mortality. . Carson JL and col [31] demonstrated a link between preoperative anemia and perioperative mortality, independat of transfusion. They had found a mortality rate of less than 2% for patients with preoperative hemoglobin level > 12g/dl and 33% for rates less than or equel to 6g/dl. The increase in the relative ris of mortality become significant for a preoperative hemoglobin level ≤ 10g/dl (RR 3.6; 95% CI [1.4-9.5]). According to studies by Musallam KM and col [32] and Carson JL and col [31], the more severe the anemia, the greater the risk of mortality. In addition, the recent data showed that all comorbidities are aggravating factors for anemia, and if anemia is a risk factor for mortality, it is also a risk factor for transfusion which itself can be a risk factor for morbidity and mortality [23, 28, 29].

In our study, there is a relationship between death and postoperative blood transfusion. This association was found to be significant (P=0.005). Observational studies by Beattie WS and col [34] had found an association between transfusion and the risk of mortality, this risk increases from 1 or 2 unit of red blood cells (OR-1.83[1.2-2.8]) and more significantly when the transfusion is greater (OR-2.99[1.8-5.1]) for 2-3 red blood cells : Glance LG and col [35] had found that the transfusion of 1 or 2 red blood cells intraoperatively after general surgery was associated with increased morbidities such as surgical site infections, pulmonary infections and mortality.

Anemia and transfusion are risk factors for perioperative morbidity and mortality. Anemia should therefore be treated preoperatively but also postoperatively in order to limit complications [34-36].

CONCLUSION

Preoperative anemia is common in abdominal surgical emergencies. It is a risk factor for perioperative morbidity and mortality. It is associated with a high overall mortality rate. This mortality was signifcantly asssociated with the severity of the anemia and blood transfusion. Incidents and intraoperative accidents were significantly associated with the severity of anemia. Thus, this management of anemia must be multidisciplinary with close collaboration between surgeons and anesthesists. There is a real challenge in diagnosing anemia preoperatively, identifying the possible causes and setting up a strategy for effective support.

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