Preoperative autologous blood donation in prostate surgery

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Abstract

Background and objectives. Urological surgery is a field in which preoperative autologous blood donation has a valid clinical application, provided that selective criteria for recruiting patients are adopted.

In order to identify patients with a real transfusion need, we reviewed the medical records of 365 patients admitted to our hospital and submitted to surgery (transvesical adenomectomy or radical prostatectomy) because of benign or malignant prostate disease.

Materials and methods. All the patients were evaluated with respect to age, weight, prostate specific antigen plasma concentration, haemoglobin concentration measured in different periods of the patient's clinical history, volume of surgically removed prostate tissue, number of donated blood units and number actually transfused.

Results. Analysis of variance, performed on these clinical variables, comparing transfused versus non-transfused patients, in accordance with the type of surgery, resulted statistically significant (p<0.001) only for haemoglobin concentration and prostate volume; however, this latter variable was significant only for the group of patients submitted to transvesical adenomectomy.

In particular, none of the patients submitted to transvesical adenomectomy received transfusions when the volume of prostate removed was less or equal to 40mL, or when preoperative haemoglobin concentration was greater or equal to 14.0g/dL.

Introduzione

Il predeposito di sangue autologo è la procedura autotrasfusionale più frequentemente adottata in chirurgia elettiva a causa della sua facile eseguibilità e dell'elevato favore che essa incontra sia presso i pazienti che i chirurghi, assicurando ai primi il minimo rischio di esposizione a sangue omologo, ai secondi la massima tranquillità in termini di adeguata copertura trasfusionale peri-operatoria. La sua utilità clinica è però oggi posta in discussione in conseguenza, da un lato, dell'elevato numero di unità autologhe che giungono a scadenza e, dall'altro, della drastica riduzione del rischio infettivo associato all'utilizzo di sangue omologo, riduzione ottenuta grazie all'introduzione dei nuovi test di screening delle malattie virali che utilizzano la metodologia di amplificazione degli acidi nucleici (NAT-test) che vengono effettuati sulle unità donate1,2. La sporadica occorrenza, inoltre, di reazioni trasfusionali anche gravi segnalate a seguito di trasfusioni di sangue autologo e recenti valutazioni economiche che evidenziano un rapporto costo/beneficio della procedura di predeposito non più così favorevole come inizialmente valutato, hanno indotto a ripensare la strategia autotrasfusionale nel suo complesso, sollevando giustificati dubbi sulla validità delle indicazioni cliniche attualmente utilizzate3-6. La chirurgia urologica e, in specifico, quella della prostata, è un ambito in cui il predeposito ha sempre registrato un grande interesse e nel quale ancor oggi si effettuano frequentemente donazioni autologhe6,7. La particolare vascolarizzazione del sito anatomico in cui risiede la prostata e la preoccupazione di sanguinamenti anomali in questa sede, inducono i chirurghi urologi ad adottare un criterio di prudenza in caso di patologie prostatiche con indicazione chirurgica, richiedendo spesso l'inclusione di questi pazienti in un
In the group of patients submitted to radical prostatectomy, the haemoglobin concentration which identified patients with no perioperative blood requirements was 14.7g/dL.

Using these selection criteria, there would have been a theoretical 64% reduction in the number of collected blood units in cases of transvesical adenomectomy and a 17% reduction in cases of radical prostatectomy; at the same time, no patient with a true haemorrhagic risk would have been excluded from the preoperative donation programme.

Conclusions. Preoperative haemoglobin concentration and adenoma volume are variables of relevant importance in selecting patients to include in a preoperative autologous blood donation programme, when prostate surgery is indicated.

Key words: autologous blood donation, prostate cancer, transfusion need

Introduction

Preoperative autologous blood donation (PABD) is the most frequent autotransfusion procedure performed in elective surgery because of its ease the great favour it meets with both patients and surgeons; indeed, it assures the former a minimal risk of exposure to homologous blood and the latter the maximum confidence in terms of adequate perioperative blood supply.

However, the clinical utility of PABD is currently under re-evaluation as a consequence of, on the one hand, the great number of autologous units which expire and, on the other hand, the significant reduction of infective risk associated with the use of homologous blood which has been obtained thanks to the introduction of the new nucleic-acid-amplification tests (NAT) that are used to screen the units of blood donated\textsuperscript{1,2}. Furthermore, the occurrence of a few, although sporadic, severe reactions reported after autologous transfusions and recent economic evaluations, showing that the cost/benefit ratio of autotransfusion strategy as a whole, with reasonable doubts having been raised on the correctness of the clinical indications actually used\textsuperscript{3-6}. Urological surgery, and specifically prostate surgery, is a field in which PABD has always been programma di predeposito\textsuperscript{8}. In termini di scadenze, però, le unità di sangue autologo raccolte in questi casi non subiscono un destino diverso da quello descritto più in generale per altre indicazioni chirurgiche\textsuperscript{7}. Lo scopo del presente lavoro è di indagare le variabili cliniche che più frequentemente sono associate ad un effettivo utilizzo trasfusionale nelle patologie prostatiche con indicazione chirurgica e, attraverso l’analisi critica dell’attività di predeposito espletata in questi pazienti, di individuare quei criteri che possono indirizzare ad una migliore selezione dei soggetti da avviare al programma di predeposito.

Materiali e metodi

Sono stati analizzati i registri sanitari e trasfusionali di 365 pazienti ricoverati consecutivamente presso la Divisione di Urologia dell’Ospedale di Desio nel periodo 1 gennaio 2002 - 30 giugno 2004 e sottoposti a terapia chirurgica per patologie prostatiche benigne o maligne. L’85% circa dei soggetti (309 pazienti) è stato arruolato nel programma di autotrasfusione attivo presso il Presidio Ospedaliero di Desio e ha effettuato predeposito di sangue su indicazione dello specialista urologo e previa valutazione clinica di idoneità condotta dal medico anestesista. I rimanenti 56 soggetti non sono stati giudicati idonei al predeposito di sangue a causa delle loro condizioni cliniche (concomitanza di patologie cardio-vascolari o polmonari) o per caratteristiche d’urgenza dell’intervento chirurgico.

I pazienti ammessi al programma di autotrasfusione hanno effettuato, nella quasi totalità dei casi, due donazioni di 350mL di sangue con intervallo donazionale di una settimana ed hanno assunto terapia marziale (525mg/die di solfato ferroso per os) per tutto il periodo di tempo compreso tra il primo predeposito e il successivo ricovero ospedaliero.

L’intervento chirurgico è sempre stato effettuato entro quattro settimane dal primo predeposito. Complessivamente, sono state prodotte 617 unità di sangue autologo raccolte dal personale del Servizio Trasfusionale che ha, inoltre, provveduto alla loro conservazione ed alla registrazione del loro destino finale.

Di tutti i soggetti sono state analizzate le variabili cliniche e di laboratorio (Tabella I) di possibile interesse nel discrimineri i pazienti con reale fabbisogno trasfusionale, quali l’età, il peso, la concentrazione plasmatica di Antigene Prostatico Specifico (PSA), i livelli di emoglobina in diverse fasi della storia clinica del paziente, la massa prostatica asportata chirurgicamente, il numero delle unità di sangue
viewed with great interest and in which autologous donations are, still today, frequently performed. The peculiar vascular system of the anatomical site of the prostate and the concern about unusual bleeding in this area induce urologists to adopt caution in the case of prostate diseases with a surgical indication and they often request the inclusion of such patients in predeposit programmes. However, the expiry rate of collected autologous blood units in these cases is not different from that more generally observed for other types or surgical procedures.

The aim of this work was to investigate the clinical variables most frequently associated with a real transfusion need in cases of prostate surgery and to identify those criteria which could be helpful in improving the selection of patients to include in a predeposit programme, through a critical analysis of predeposit activity in these subjects.

Materials and methods

The medical and transfusion records of 365 patients consecutively admitted to the Urology Department of Desio Hospital from January 1, 2002 to June 30, 2004 and submitted to surgery for benign or malignant prostate disease were reviewed. Of these patients, 309 subjects (85%) were enrolled in the autotransfusion programme active in our institution and donated autologous blood upon the urologist's indication and after a clinical evaluation by the anaesthesiologist. The remaining 56 subjects were excluded from the predeposit programme because of their clinical conditions (cardiovascular or pulmonary diseases) or because surgery was performed as an emergency.

Table I - Clinical and laboratory variables investigated.

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- Pre-depositate e di quelle effettivamente utilizzate a fini trasfusionali, nonché l'eventuale ricorso a trasfusioni con emocomponenti derivanti da donazione omologa (concentrati eritrocitari, plasma o concentrati piastrinici).

Il volume del materiale prostatico asportato chirurgicamente è stato determinato mediante immersione del pezzo operatorio in liquido fissativo e registrando la variazione di livello del liquido stesso osservabile sulla parete di un contenitore graduato.

Per quanto riguarda invece la concentrazione di emoglobina, le diverse misurazioni sono state effettuate in condizione basale, al momento del ricovero, al tempo delle eventuali trasfusioni e, comunque, ogni 12 ore circa nei giorni immediatamente successivi all'intervento chirurgico, al fine di rilevare il livello minimo di emoglobina raggiunto nel periodo post-operatorio.

I valori di PSA presi in considerazione in questo studio sono stati determinati in occasione degli usuali accertamenti diagnosticisti eseguiti di routine in assenza, però, di una qualsiasi manovra meccanica esercitata sulla prostata a scopo clinico-diagnostico o di un processo infettivo o flogistico a suo carico e, comunque, in assenza di eventuale terapia antibiotica, anti-inflammatoria od ormono-soppressiva.

Per i pazienti affetti da ipertrofia prostatica benigna, sono stati presi in considerazione i valori più elevati di PSA ottenuti in un tempo antecedente all'intervento chirurgico (max 10 mesi) in assenza di terapia con Finasteride ma ammettendo, invece, gli inibitori dei recettori α-adrenergici; per i soggetti affetti da adenocarcinoma, sono stati considerati i valori misurati prima di iniziare la terapia ormono-soppressiva.

Tutti i dati sono stati organizzati raggruppando i soggetti in base al tipo di intervento chirurgico subito - Adenomecnotomia Transvesicale (AT) o Prostatectomia Radicale (PR) - e raffrontando i valori dei pazienti trasfusi verso quelli non trasfusi. L'analisi statistica descrittiva è stata effettuata utilizzando le funzioni statistiche di Excel 2000, mentre gli studi di correlazione o di inferenza sulle medie, cioè il confronto fra gruppi e l'analisi della varianza (ANOVA), sono stati condotti utilizzando il programma Sas System 8.2.

Risultati

Dei 309 pazienti arruolati nel programma di predeposito di sangue, 137 soggetti sono stati sottoposti ad AT sulla base di una diagnosi clinica di
In almost every case, the patients admitted to the autotransfusion programme donated two units of 350mL of blood with a donation interval of one week, and received iron supplementation (525mg/die ferrous sulfate per os) during the period between the first predonate and the subsequent admission for surgery. Surgery was always performed within four weeks of the first blood predonate. In total, 617 autologous blood units were collected and stored in the local Blood Bank and their final destiny recorded.

Clinical and laboratory variables (Table 1) useful in discriminating patients with a real blood transfusion need were statistically evaluated. These variables included age, weight, prostate specific antigen (PSA) concentration, haemoglobin concentration at different times of the patients’ clinical history, volume of surgically removed prostate tissue, number of donated autologous blood units, number of units actually transfused, and, finally, the use of homologous blood components (plasma, platelet or red blood cell concentrates).

The volume of surgically removed prostate tissue was measured by immersing the removed material into a fixative solution and recording the variation in the level of this solution, seen on the wall of a graduated cylinder.

Haemoglobin concentrations were measured at basal condition, on admission to hospital, at the moment of transfusion and at 12-hour intervals in the days following surgery with the aim of detecting the minimum level of haemoglobin that occurred in the postoperative period.

PSA values considered in this study were measured before surgery (a maximum of 10 months) in the absence of possible finasteride therapy but not of alpha-adrenergic receptor antagonists; in patients with prostate carcinoma we considered the values measured before the administration of hormone-suppressive therapy.

Data were analysed grouping patients according to the occurrence of a real blood transfusion as compared to those who did not need any transfusion in the postoperative period.

In patients affected by benign adenomatous prostate hypertrophy we considered the highest PSA values measured on the day of surgery (a maximum of 10 months) in the absence of possible finasteride therapy but not of alpha-adrenergic receptor antagonists; in patients with prostate carcinoma we considered the values measured before the administration of hormone-suppressive therapy.

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Figure 1 - Autologous blood units collected and transfused according to type of surgery

Figure 2 - Patients included in the predeposit programme divided according to transfusion activity and type of surgery

Results

Of the 309 patients enrolled in the predeposit programme, 137 subjects were submitted to TA on AT (Tabella II). La concentrazione di emoglobina è risultata significativamente inferiore nei soggetti trasfusi rispetto a quelli non trasfusi e questa significatività è evidenziabile in tutte le diverse fasi cliniche indagate e per entrambi i tipi di interventi chirurgici, a parità di numero di unità autologhe predepositate.

In particolare, nel gruppo di pazienti sottoposti ad AT non un soggetto ha subito trasfusioni quando la concentrazione di emoglobina preoperatoria, misurata al momento del ricovero ospedaliero, è risultata superiore a 14,0g/dL e ciò indipendentemente dal volume del materiale prostatico asportato durante la seduta operatoria. Nel gruppo di pazienti sottoposti a PR la concentrazione di emoglobina preoperatoria risultata "protettiva" nei confronti...
Autologous transfusion in prostate surgery

The basis of a clinical diagnosis of benign prostate hypertrophy, whilst the remaining 172 patients underwent RP because of neoplastic disease (prostate carcinoma) diagnosed by means of fine needle biopsy.

In those patients who underwent TA, the preoperative diagnosis of benign hypertrophy was subsequently confirmed by tissue section microscopic analysis in 96% of cases; in six subjects histological examination revealed microfoci of adenocarcinoma. However, none of these patients required any additional surgery, since none had recurrence of disease during the strict surveillance follow-up period. The diagnosis of malignant disease was confirmed in all the subjects who underwent RP.

The total of 617 units of autologous blood were collected, with a mean of 2 units per patient; no difference was observed in the mean number of blood units collected in the two groups of subjects who underwent different surgical treatments.

The cumulative use of autologous blood units was 36.9%, but significant differences were found according to the type of surgery performed: in cases of TA, only 27% of the blood was used (72 units transfused out of 269 predeposited), whilst, in cases of RP, this use increased to 45% (156 units transfused out of 348 collected) (Figure 1).

In relation to the number of patients receiving a transfusion, 34% of the patients undergoing TA were transfused (47 transfused vs. 90 not transfused) and 57% of those submitted to RP received transfusions (98 transfused vs. 74 not transfused) (Figure 2). However, it is important to highlight that single units of autologous blood were transfused in both groups of patients, this happening in 45% of the transfused subjects who underwent TA (21 subjects out of 47) di eventi trasfusionali è stata invece di 14,7g/dL. Il volume del materiale prostatico asportato chirurgicamente ha evidenziato variazioni statisticamente significative solo nel gruppo di pazienti operati di AT, mostrando valori mediamente più elevati nei soggetti trasfusi rispetto a quelli non trasfusi: 81mL rispetto a 50mL (p<0,001).

In questo gruppo di soggetti è anche importante osservare che nessun paziente è stato trasfuso per un volume di materiale prostatico inferiore a 40mL. È questa un’osservazione rilevante, che verrà opportunamente analizzata nell’ambito della successiva discussione dei risultati insieme all’osservazione della mancanza di significatività, riscontrata per questo stesso parametro, nel gruppo di soggetti operati di PR.

All’analisi statistica, nessuna significatività è stata riscontrata anche nei livelli di PSA misurati nei due diversi gruppi di soggetti e, all’interno della stessa gruppo, tra pazienti trasfusi e non trasfusi (Tabella II).

Per quanto riguarda, infine, i soggetti trasfusi con una sola unità di sangue, nell’intento di valutare la reale necessità clinica di queste singole trasfusioni, sono stati confrontati i valori di emoglobina dei pazienti trasfusi, misurati al momento dell’evento trasfusione, raffrontandoli con quelli di concentrazione minima raggiunta nel periodo post-operatorio dai soggetti non trasfusi, ciò a parità di condizioni cliniche generali dei pazienti e di operazione chirurgica subita.

Le figure 3 e 4 evidenziano chiaramente, in entrambi i tipi di intervento chirurgico, che non sussiste alcuna differenza nei livelli di emoglobina post-operativa raggiunti dai pazienti trasfusi con una sola unità rispetto a quelli non trasfusi, significativamente inferiore è, invece, l’emoglobina misurata al momento della prima trasfusione nei soggetti che hanno ricevuto entrambe le loro unità di sangue.

| Table II – Results of analysis of variance performed on main clinical and laboratory variables in patients submitted to surgery |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | TRANSVESICAL ADENOMECTOMY |                 | RADICAL PROSTATECTOMY |                 |
| Variables       | Transfused mean (min - max) | Non-transfused mean (min - max) | p value | Transfused mean (min - max) | Non-transfused mean (min - max) | p value |
| Age (years)     | 68 (51 - 82) | 67 (57 - 78) | NS | 67 (52 - 79) | 65 (52 - 82) | NS |
| Removed Prostate Tissue (mL)* | 81 (28 - 192) | 50 (25 - 100) | <0.001 | 42 (23 - 135) | 37 (20 - 132) | NS |
| Basal Hb (g/dL) | 13.9 (12.3 - 16.1) | 14.5 (12.2 - 17.1) | <0.004 | 13.7 (11.5 - 15.7) | 14.4 (12.3 - 16.6) | <0.001 |
| Preoperative Hb (g/dL) | 12.7 (11.1 - 14.9) | 13.4 (10.9 - 15.6) | <0.003 | 12.7 (10.4 - 14.7) | 13.4 (10.8 - 15.6) | <0.001 |
| Pretransfusion Hb (g/dL) | 10.1 (8.0 - 12.9) | 9.5 (6.5 - 11.0) | <0.001 | 9.0 (5.8 - 11.3) | 10.5 (9.1 - 13.4) | <0.001 |
| PSA (ng/mL)* | 4.7 (5.27 - 18.6) | 6.0 (0.20 - 17.3) | NS | 7.2 (0.34 - 9.1) | 5.8 (0.1 - 21.4) | NS |

* median value
Legend: Hb = haemoglobin; NS = not significant; n = number of patients
and in 39% of the transfused patients who had a RP (38 patients out of 98). Homologous units, either red blood cell concentrates or fresh frozen plasma, were required on occasions in both surgical situations: 18 units were required in cases of TAA (6 subjects transfused) and 34 units in cases of RP (12 subjects transfused). All the patients who received homologous transfusions had already received their own predeposited blood before receiving donor blood or plasma.

ANOVA performed on clinical and laboratory variables, and taking into account data on transfused versus non-transfused patients, showed statistical significance only for the haemoglobin concentration (in both types of surgical intervention) and the volume of surgically removed prostate material (only in the group of patients submitted to TA) (Table II). Considering patients with the same number of donated autologous blood units, haemoglobin concentrations were significantly lower in transfused subjects than in those not transfused in all the different clinical phases investigated in the study and in both surgical situations.

In the group of patients submitted to TA, none of those with a preoperative haemoglobin concentration, measured at the time of hospital admission, higher than 14.0 g/dL received a blood transfusion, independently of the volume of prostate tissue removed during surgery.

In the group of patients submitted to RP, the preoperative haemoglobin concentration which resulted "protective" with regards to blood transfusion autologo (p<0.001). A questo stesso proposito, per entrambi i tipi di intervento chirurgico sono stati anche ricavati i valori di cut-off di emoglobina preoperatoria che identificano i pazienti trasfusi esclusivamente con una unità di sangue autologo rispetto a quelli trasfusi con due o più unità; ciò al fine di individuare più selettivamente un possibile valore "limite" di emoglobina da utilizzare come criterio di selezione per l’arruolamento dei pazienti da avviare al predeposito.

Questi valori (13.9 g/dL nella AT e 14.5 g/dL nella PR) non sono però risultati significativamente diversi da quelli già precedentemente individuati come "protettivi" nei confronti degli eventi trasfusionali (14.0 g/dL nella AT e 14.7 g/dL nella PR) sollevando perciò, anche per questo motivo, dubbi ragionevoli sulla reale necessità clinica delle trasfusioni effettuate, con singole unità, in questi pazienti.

**Discussion**

Il predeposito di sangue, insieme alle altre tecniche autotrasfusionali, è una consolidata e valida procedura di risparmio di sangue omologo in ambito chirurgico e di tutela della salute del paziente; la trasfusioni di sangue autologo costituisce, infatti, l’unica forma di supporto ematico priva di rischio infettivo per quanto attiene la trasmissione di malattie virali, parassitarie o da prioni e, per questo motivo, incontra largo consenso anche tra i pazienti. La transfusione di sangue
was 14.7g/dL. The volume of surgically removed prostate tissue evidenced statistically significant differences only in the group of patients submitted to TA, the median values being higher in transfused subjects than in non-transfused patients: 81 versus 50mL (p<0.001).

In this group of subjects, it is also important to observe that no patient was transfused when less than 40mL of prostate material was removed. This observation will be discussed later, together with the lack of significance observed for this same variable in the group of subjects who underwent RP.

No statistical significance was found in PSA values in the two different groups of subjects and, within the same group, between transfused and non-transfused patients (Table II). Finally, considering those patients transfused with only one unit of autologous blood, and in order to evaluate the real clinical usefulness of these single transfusions, we compared haemoglobin values of transfused patients, measured at the moment of transfusion, with the minimum level of haemoglobin reached by non-transfused subjects during the postoperative period; these analyses were done in patients with comparable clinical conditions and undergoing the same type of surgery.

Figures 3 and 4 clearly show, for both types of surgery, that there was no difference in the postoperative haemoglobin values in the patients transfused with only one unit of blood and the values in those not transfused at all; in contrast, the haemoglobin concentration measured at the time of the autologous transfusion in prostate surgery
first transfusion was significantly lower in the subjects who received both their units of autologous blood (p<0.001).

On this specific point, and in the two different surgical situations, we also calculated the preoperative haemoglobin "cut-off" values that identify patients exclusively transfused with one unit of autologous blood, compared to those transfused with two or more units. The aim of this analysis was to identify a possible haemoglobin "threshold" value which might be used as a more specific selection criterion for the enrolment of patients in a predeposit programme.

However, these values (13.9 g/dL in TA and 14.5 g/dL in RP) were not significantly different from those previously identified as "protective" with regards to possible transfusion therapy (14.0 g/dL in TA and 14.7 g/dL in RP) raising further doubt on the real clinical usefulness of the single unit transfusions performed in these patients.

Discussion

PABD, as well as other autotransfusion techniques, is a valid procedure which spares the use of homologous blood in surgery and protects the patient's health. Autologous blood transfusion is, in fact, the only form of blood supply free of infectious risk as far as viral, parasite and prion diseases are concerned and for this reason it meets with great favour among patients. However, autologous blood transfusion is not completely exempt from risks, such as bacterial contamination; indeed, the incidence of this complication may be even higher with autologous transfusions than with homologous blood\(^{20}\). Another important problem frequently observed with PABD is the high percentage of units destroyed because they have expired; as many as 80% of the collected units may be eliminated\(^{19}\).

The analysis of the predeposit activity in our patients highlighted two main problems: a) a low transfusion use of the autologous blood units; b) frequent occurrence of transfusions of single units of autologous blood. These problems underline the need for a more precise evaluation of the haemorrhagic risk in patients submitted to the two types of surgical interventions that we investigated and for the adoption of more stringent clinical criteria to start transfusion therapy, even when performed with autologous blood.

In this group of patients (AT) no patient has shown a real necessity for transfusion (2 or more transfusions) when the mass of prostate was estimated to be inferior to 40 mL (Fig. 5), whereas for volumes superior to this, the probability of receiving transfusions. In fact, no patient operated of AT has shown that the need for transfusion is based on the haemoglobin baseline of the patient; the first of these elements is more closely linked to the mass of prostate surgically removed and the level of haemoglobin that directly results from it: the higher was the haemoglobin baseline of patients, the greater was the probability of receiving transfusions. Indeed, no patient operated of AT showed a real need for transfusion if the haemoglobin baseline of preoperative was superior to 14.0g/dL, and this independently of the mass of prostate surgically removed.

In our data it has been found that the indication for transfusion is based more on criteria of "availability of blood" than of real necessity. This means that the decision to transfuse has been made in a more or less indifferent way, even if the real necessity for transfusion has been underlined in the patients operated of AT.

Concluding, the adoption of criteria for selection of patients operated of AT is a necessity, not only for the patients who are going to receive treatment, but also for the patients who are not going to receive treatment. In fact, in these cases, it is not possible to condone, for the patients who are not going to receive treatment, the real necessity for transfusion.

Quanto rilevato nel caso della patologia prostatica benigna non può essere trasferito tout-court ai casi con patologia maligna e operati di PR.
The doubtful utility of transfusing single units of blood has been often stressed by many Authors, and is further confirmed in our study, considering the haemoglobin values measured at the time of transfusion in these patients with respect to haemoglobin values detected in the postoperative period in patients who did not receive any transfusion at all (Figures 3 and 4). These data suggest that transfusion therapy was started in many patients mainly because of "blood availability" rather than real "blood need" and demonstrate that transfusions of single units of blood should be abandoned, except in very rare cases.

On the basis of our study, we can affirm that the two factors most directly correlated with blood use in prostate surgery are: a) the volume of prostate tissue surgically removed, and b) the patient's basal haemoglobin level; the first of these two factors was, however, only statistically significant in the group of patients who underwent TA.

In this group of subjects (TA), no patients from whom less than 40 mL of prostate tissue was removed had a real transfusion need (two or more transfusions) (Figure 5), whilst, among those who had a greater volume of prostate removed, blood loss reached clinical relevance only in relation to the patient's basal haemoglobin value; that is, the lower the preoperative haemoglobin, the greater the chance of receiving a blood transfusion.

None of the patients undergoing TA who had a preoperative haemoglobin concentration higher than 14 g/dL was transfused, independently of the volume of prostate surgically removed.

Le ragioni per cui il volume di tessuto prostatico asportato chirurgicamente assume un diverso significato statistico nelle due situazioni chirurgiche descritte sono, a nostro parere, strettamente legate al tipo di patologia tumorale, al diverso trattamento farmacologico adottato nel periodo pre-operatorio e al diverso approccio chirurgico instaurato.

La particolare conformazione vascolare della loggia prostatica e il differente interessamento delle strutture vasali che si vengono ad aggredire nella PR rispetto all'AT possono giustificare, nel primo caso, l'imprevedibilità dell'evento emorragico in confronto, invece, alla sua proporzionalità nel secondo caso.

L'analisi statistica dei dati presenti nella nostra casistica indica che, in caso di PR, l'emoglobina è l'unica variabile utile a discriminare i pazienti con possibile necessità trasfusionale individuando nel valore...
pre-operatorio di 14,7 g/dL il suo cut-off. Al di sopra di questo valore, perdite ematiche peroperatorie, anche significative, non sono state in grado di indurre in questi pazienti una condizione anemica così grave da dover ricorrere alla terapia trasfusionale.

Adottando questo criterio nella selezione dei pazienti da avviare al predeposito, nei soggetti operati di PR il risparmio teorico di unità di sangue raccolte sarebbe stato nella nostra casistica, però, solo del 17% mantenendo, comunque, gli stessi livelli di sicurezza trasfusionale per tutti i pazienti; l’utilizzo trasfusionale avrebbe raggiunto la quota del 59%.

Da ultimo, ci sembra opportuno formulare un breve commento inerente i risultati dell’analisi statistica osservati a carico del PSA. Il dosaggio di questo marker è risultato un fattore del tutto estraneo all’utilizzo trasfusionale registrato a carico dei nostri pazienti, ma questa osservazione non deve sorprendere. Pur essendo, infatti, il PSA un marcatore correlato col volume della prostata nella iperplasia benigna e un valido indice diagnostico nell’adenocarcinoma, il suo dosaggio non può, in realtà, trovare una utile applicazione nella valutazione del fabbisogno trasfusionale perioperatorio per ragioni legate alle variabili anatomo-chirurgiche e alle eventuali terapie mediche instaurate.

**Conclusioni**

Il predeposito di sangue autologo è una modalità donazionale che detiene tuttora un suo specifico ruolo in ambito chirurgico ma l’arruolamento dei pazienti in un programma di donazioni autologhe deve basarsi non solo su criteri selettivi di idoneità fisica del soggetto ma anche di valutazione del reale rischio emorragico peroperatorio e, quindi, di una reale necessità trasfusionale.

Nei pazienti candidati all’AT non sussisteva indicazione al predeposito per i soggetti con emoglobina basale superiore a 14,0 g/dL o quando l’intervento chirurgico ha un interessamento anatomico limitato (<40 mL); in caso di PR, il valore di emoglobina basale in base al quale non si osserva necessità trasfusionale è, invece, di 14,7 g/dL.

Particolare attenzione deve essere posta, infine, nell’evitare trasfusioni di singole unità che, non apportando alcun significativo beneficio clinico, possono invece indurre inutili rischi aggiuntivi al paziente.
show that, in the case of RP, haemoglobin concentration is the only variable useful in discriminating patients with possible transfusion need and indicate a preoperative cut-off value of 14.7 g/dL.

Above this value, even substantial perioperative blood losses do not cause such marked anaemia as to require transfusion therapy.

Using this criterion for the selection of patients to be admitted to a predeposit programme, the theoretical reduction in the number of blood units that would have been collected in our population of patients planned for RP would have been only 17%, while maintaining the same level of transfusion safety for all of the patients; blood use in RP would have reached 59%.

Finally, it may also be useful to make a brief comment on the statistical analysis performed on PSA values. The values of this marker were completely unrelated to the blood use recorded in our patients, but this observation should not be a surprise. Indeed, PSA has been demonstrated to be a useful biological marker correlated with prostate volume in benign hypertrophy and an important diagnostic test in prostate adenocarcinoma, but its assay is not useful in the evaluation of perioperative transfusion needs since these needs are strictly related to surgical and anatomic variables and to the medical therapies that may have been administered prior to surgery.

Conclusions

PABD is a form of donation which still maintains a specific role in surgery but the enrolment of patients in a programme of autologous donations must be based not only on selective criteria of the individual's physical suitability, but also on an evaluation of the real perioperative haemorrhagic risk and, consequently, of the real transfusion need.

Among patients who are planned to undergo TA, there is no indication, predeposit autologous blood for those subjects whose basal haemoglobin is higher than 14.0 g/dL or when the extent of surgery will be limited (<40 mL of prostate tissue to be removed); in cases of RP, transfusions should not be necessary when the patient’s basal haemoglobin value is higher than 14.7 g/dL.

Finally, particular attention must be given to avoiding single unit transfusions which do not offer any significant clinical advantage, but may expose the patients to additional and useless risks.

Riassunto

Introduzione. La chirurgia urologica è un campo nel quale la donazione di sangue autologo trova una valida applicazione clinica posto che i criteri di arruolamento dei pazienti siano selettivi.

Al fine di identificare i pazienti con reale fabbisogno trasfusionale, abbiamo analizzato i registri sanitari di 365 pazienti sottoposti a terapia chirurgica (adenomectomia transvesicale o prostatectomia radicale) a causa di patologie prostatiche benigne o maligne.

Materiali e metodi. Di tutti i soggetti sono stati valutati: l'età, il peso, la concentrazione plasmatica di antigene prostatico specifico, i livelli di emoglobina in diverse fasi della storia clinica del paziente, il volume del materiale prostatico asportato chirurgicamente, il numero delle unità di sangue predepositate e di quelle utilizzate.

Conclusioni. L'emoglobina preoperatoria e il volume prostatico sono variabili di rilevante importanza nella selezione dei pazienti da avviare al predeposito nella chirurgia della prostata.

Parole chiave: donazione autologa, tumore prostatico, fabbisogno trasfusionale.
References

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