

VALUTAZIONE DELLA COMPOSIZIONE CORPOREA IN CARDIOLOGIA RIABILITATIVA: UNO SGUARDO OLTRE AL PESO SU PAZIENTI CARDIOCHIRURGICI

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INTRODUZIONE

La valutazione corporea tramite bioimpedenzionetria vettoriale è in grado di fornire informazioni qualitative supplementari rispetto agli usuali valori di laboratorio e alle misure antropometriche.

Abbiamo indagato l'effetto di un percorso riabilitativo sulla composizione corporea di soggetti afferenti dopo intervento cardiochirurgico maggiore.

METODI

I 96 soggetti coinvolti (81 maschi e 15 femmine), aventi età media di 64.0 ± 11.3 anni, sono stati ricoverati presso il Cardiocentro Ticino con diagnosi di STEMI, NSTEMI, valvulopatia o dissezione aortica e trattati con intervento di bypass, ricostruzione o sostituzione di valvola o aorta.

Durante il percorso in Cardiologia Riabilitativa i pazienti sono stati sottoposti ad esame di

bioimpedenziometria vettoriale durante la visita iniziale e, dopo tre mesi, durante quella finale.

Nello specifico sono stati indagati i seguenti parametri: angolo di fase (PhA, misura generale qualitativa dell'organismo), acqua extracellulare (ECW), massa grassa (FM), massa cellulare indicizzata all'altezza (BCMI), componente quest'ultima della massa magra.

RISULTATI

L'acqua extracellulare (ECW), inizialmente presente in eccesso (49,07% dell'acqua totale contro un valore normale del 45%) si è ridotta da 21,50 litri a 20,72 litri negli uomini (-3.63%; $p < 0.001$) e da 21,38 litri a 20,68 litri nelle donne (-3.27%; $p < 0.002$). La massa cellulare indicizzata all'altezza (BCMI), viceversa, è aumentata da 10.16 kg/m^2 a 10.78 kg/m^2 negli uomini (+3.63%; $p < 0.0001$) e da 10.07 kg/m^2 a 10.73 kg/m^2 nelle donne (+3.23%; $p < 0.002$).

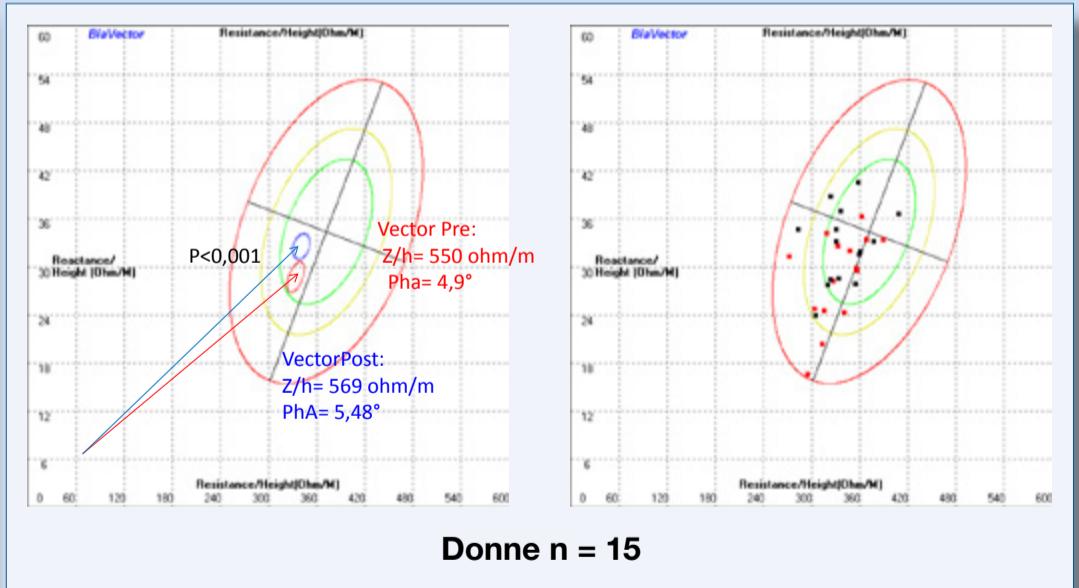
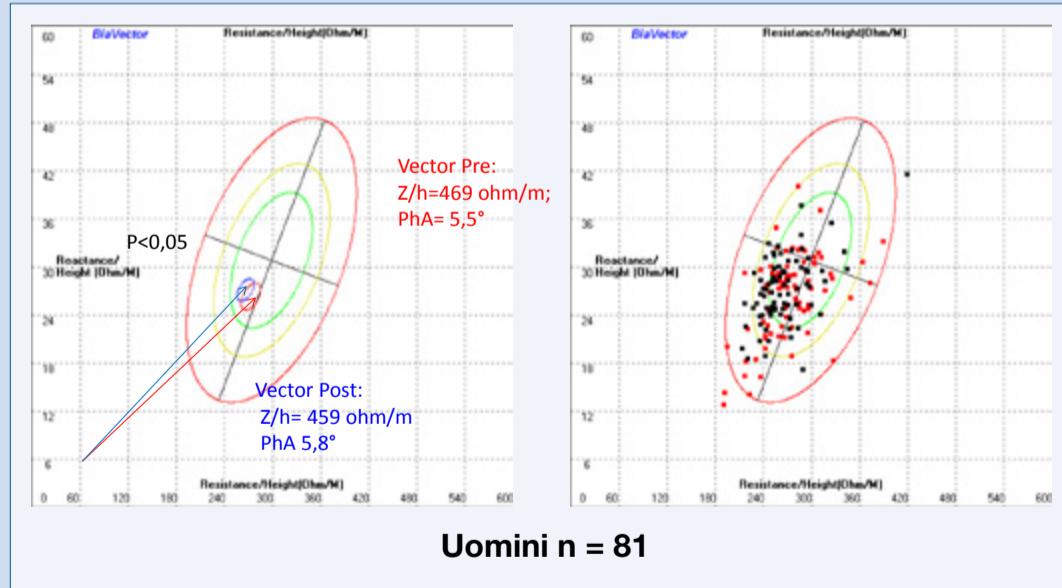
Inoltre abbiamo verificato una riduzione significativa della massa grassa (FM) da 19.53 kg a 18.48 kg negli uomini (-5.38%; $p < 0.0001$) e da 19.63 kg a 18.68 kg nelle donne (-4.84%; $p < 0.004$).

Quindi, nonostante un peso stabile (+0,04 kg, $p = \text{NS}$), abbiamo ottenuto un aumento significativo dell'angolo di fase di 0.30° nei soggetti di sesso maschile (+5.17%; $p < 0.05$) e di 0.58° nei soggetti di sesso femminile (+10.58%; $p < 0.001$).

| | UOMINI | | | DONNE | | |
|--|--------|-------|--------------|-------|-------|-------------|
| | 0 m | 3 m | | 0 m | 3 m | |
| ECW (litri) | 21.50 | 20.72 | $p < 0.001$ | 21.38 | 20.68 | $p < 0.002$ |
| BCMI (kg/m^2) | 10.16 | 10.78 | $p < 0.0001$ | 10.07 | 10.73 | $p < 0.002$ |
| FM (kg) | 19.53 | 18.48 | $p < 0.0001$ | 19.63 | 18.68 | $p < 0.004$ |



Posizione degli elettrodi utilizzati per l'analisi impedienziometrica bioelettrica vettoriale (BIVA)



Vettore di impedenza medio ed ellissi di confidenza: normogramma per sesso (in rosso: valutazione alla visita iniziale – in blu: valutazione alla visita finale).

CONCLUSIONI

Il passaggio da una misurazione quantitativa (peso) ad una qualitativa (bioimpedenziometria vettoriale) ha permesso di valutare delle modificazioni altrimenti non misurabili. È stato possibile verificare una riduzione significativa dell'acqua extracellulare (ECW) in entità clinicamente rilevante, nonostante essa non risulti detectabile alla visita clinica del paziente.

Il peso complessivo dei soggetti non risulta significativamente modificato a cau-

sa della riduzione della massa grassa (FM) con contemporaneo incremento della massa cellulare muscolare (BCMI). Questi dati suffragano l'uso dell'impedenziometria vettoriale al fine di ottenerne dati di interesse clinico, ma anche a livello motivazionale per il paziente che, pur non vedendo modificazioni quantitative, può avere riscontro del beneficio del percorso riabilitativo a livello di composizione corporea.

GLOBAL RADIOLOGICAL EXPOSURE OF TAVI, AN UNRESOLVED ISSUE WITH POTENTIAL DRAWBACKS IN LOW AND INTERMEDIATE RISK PATIENTS

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INTRODUCTION

Transcatheter Aortic valve interventions (TAVI) are the treatment of choice in high risk patients with severe aortic stenosis. Current trend is to adopt TAVI also in lower risk, younger patients in whom radiological exposure should be considered in the decision making process. Our aim is to describe the global radiological exposure observed in a contemporary series of TAVI patients.

METHODS

75 patients who underwent TAVI for severe aortic stenosis between January 2015 and May 2016 were retrospectively evaluated. Clinical characteristics, procedural data and fluoroscopic exposure during the pre procedural work up, the procedure and the post procedural phase were collected. In order to add and compare exposure deriving from different imaging modalities, the effective dose (ED), was calculated and values expressed in milliSievert (mSv).

RESULTS

Mean global radiological exposure of patients undergoing TAVI was 71.47 ± 102.62 mSv. TAVI procedure accounted for 64.09% of global exposure (46.09 ± 98.75 mSv), coronary angiographies/PCI for 17.91% (12.8 ± 13.5 mSv), TC scans for 11.99% (12.4 ± 9.8 mSv), PM implantations for 5.76% (4.13 ± 2.73 mSv) and other radiological examinations for 0.25% (0.36 ± 0.61 mSv). In 10 out of 77 patients (13%), the global effective dose exceeded 100 mSv with 3 cases exceeding 300 mSv.

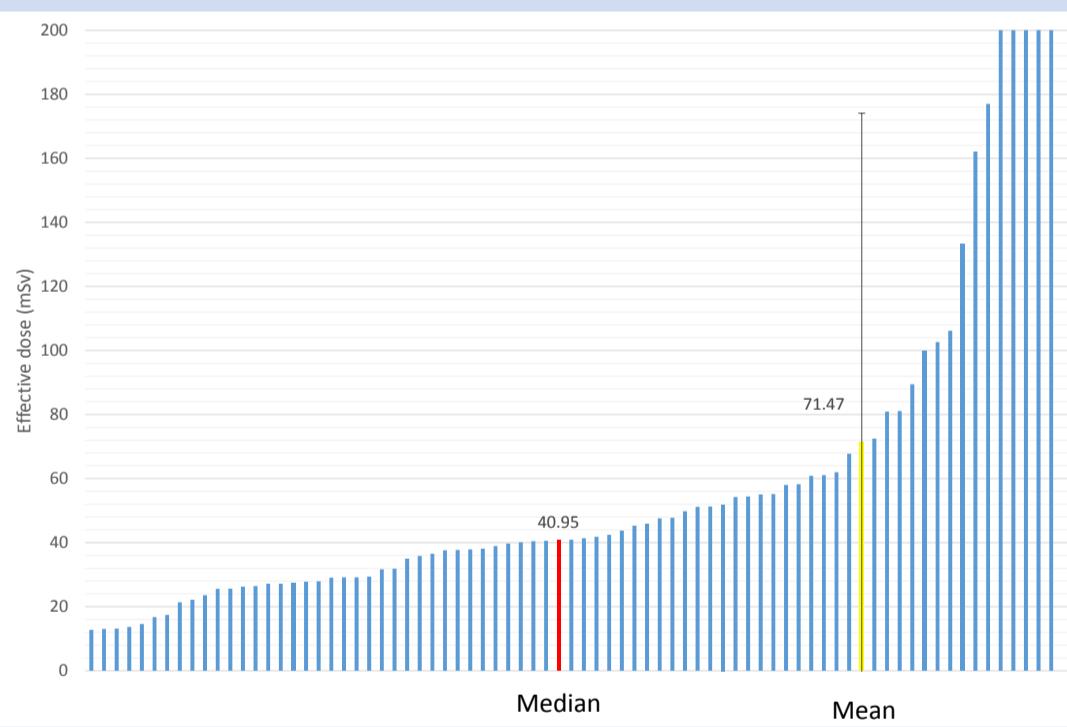


Figure 1.
Cumulative effective dose
of the whole TAVI pathway

Table 1. Patient's characteristics

| | N. | 75 |
|---|------------|----|
| Male n, (%) | 43, (57.3) | |
| Age, y | 82.6±6.0 | |
| Height (cm) | 164.3±8.9 | |
| Weight (Kg) | 71.9±13.7 | |
| Body Mass Index | 26.6±4.7 | |
| BSA (m ² , Haycock) | 1.8±0.2 | |
| Diabetes n, (%) | 23, (30.6) | |
| Dialysis n, (%) | 1, (1.3) | |
| Hypertension n, (%) | 67, (89.3) | |
| Dyslipidemia n, (%) | 51, (68.0) | |
| COPD n, (%) | 11, (14.7) | |
| Previous cerebrovascular event n, (%) | 6, (8.0) | |
| Previous pacemaker implant n, (%) | 8, (10.7) | |
| Previous ICD implant n, (%) | 0, (0) | |
| Previous coronary artery disease n, (%) | 44, (58.7) | |
| Atrial fibrillation n, (%) | 11, (14.7) | |
| BMI>30 n, (%) | 21, (28.0) | |

CONCLUSIONS

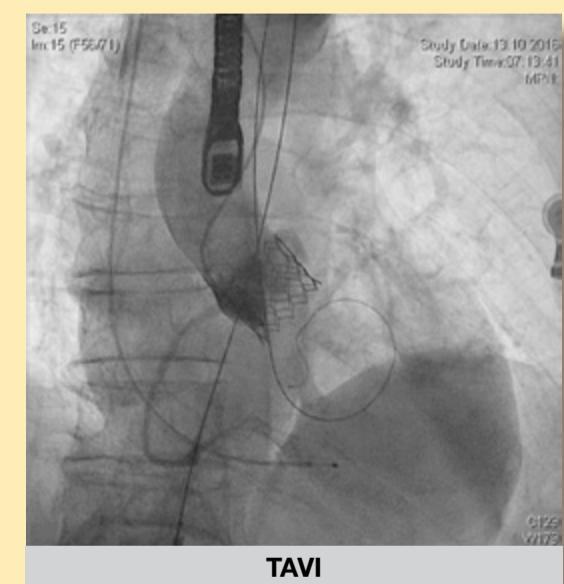
TAVI is associated with a significant X-ray exposure, that can be accepted in older patients with lower probability of stochastic radio-induced events, but clear action is needed in order to reduce radiological exposure of intermediate and low risk patients. More than 10% of patients receive a global exposure greater than 100 mSv, associated with a lifetime cancer risk of 1/100.



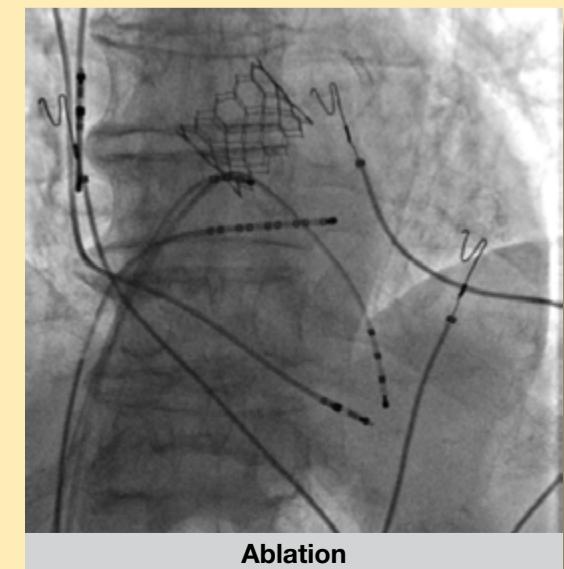
PTCA



CT



TAVI



Ablation

AUTOMATED LEFT VENTRICLE QUANTIFICATION WITH NEW 3D ECHO SOFTWARE: COMPARISON WITH CARDIAC MAGNETIC RESONANCE

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BACKGROUND

Cardiac magnetic resonance (CMR) is the standard reference technique in left ventricular (LV) quantification since it permits a clear differentiation between compacted myocardium and trabeculae. 3D transthoracic echocardiography (3DTTE) has been shown to consistently underestimate LV volumes because of less precise endocardial border identification. A novel automatic 3DTTE software (HeartModel, HM; Philips Medical System) [Figure 1-2] permits manual contour adjustment: the slider corresponding to LV borders can be globally repositioned, moving from internal blood-non compacted myocardium interface to external compacted myocardium interface.

AIM

The aim of this study is to evaluate the correlation in quantification of LV between CMR and HM after relocation of the slider at the compacted myocardium interface.

METHODS

113 patients referred for CMR (3-T, Siemens-Skyra) underwent 3DTTE (HM, Epiq, X5-1, Philips). LV parameters measured with CMR, HM and standard 3DTTE were end-diastolic volume (EDV), end-systolic volume (ESV) and ejection fraction (EF). Correlation was evaluated using linear regression with Pearson coefficient.

RESULTS

Modified HM shows high correlation with CMR (EDV r:0.90, ESV r:0.94, EF r:0.84). It still lightly underestimates LV volumes, but consistently reduces this gap in comparison with standard 3DTTE (CMR-EDV 147±58 ml; CMR-ESV 64±54; HM-EDV 144±52; HM-ESV 62±50; 3DTTE-EDV 105±44; 3DTTE-ESV 47±38). [Table 1]. HM analysis took less time than standard 3DTTE (63±9 seconds vs 129±20).

Figure 1. Automatic LV Reconstruction and Quantification

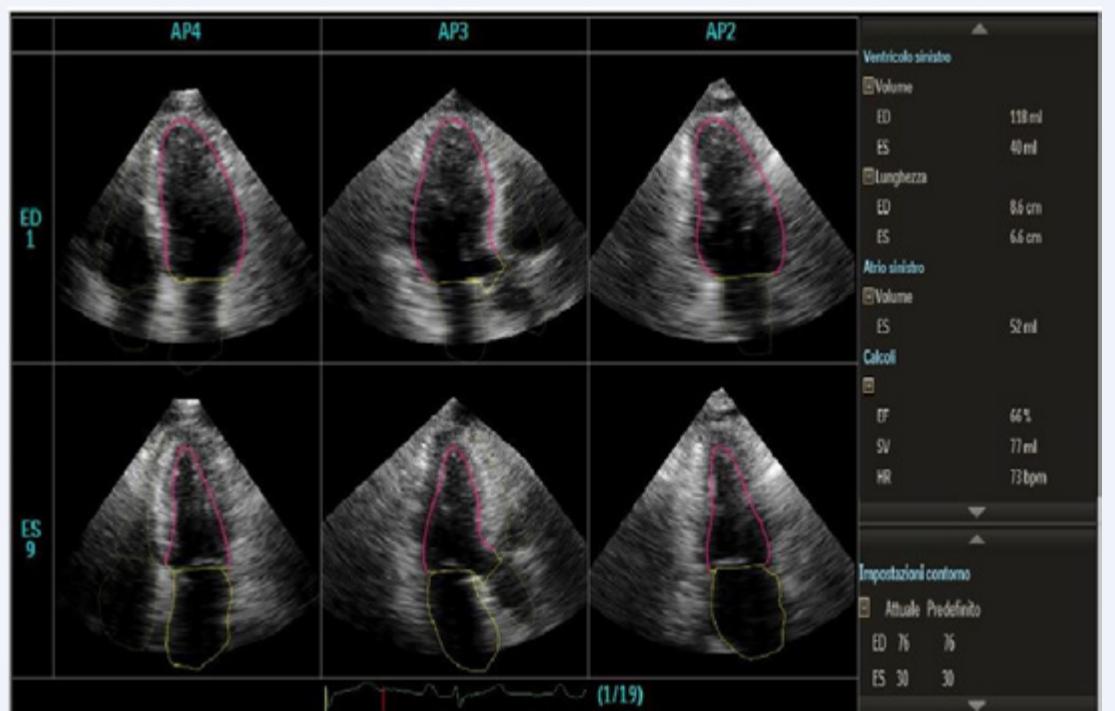


Figure 2. Final LV Model Reconstruction

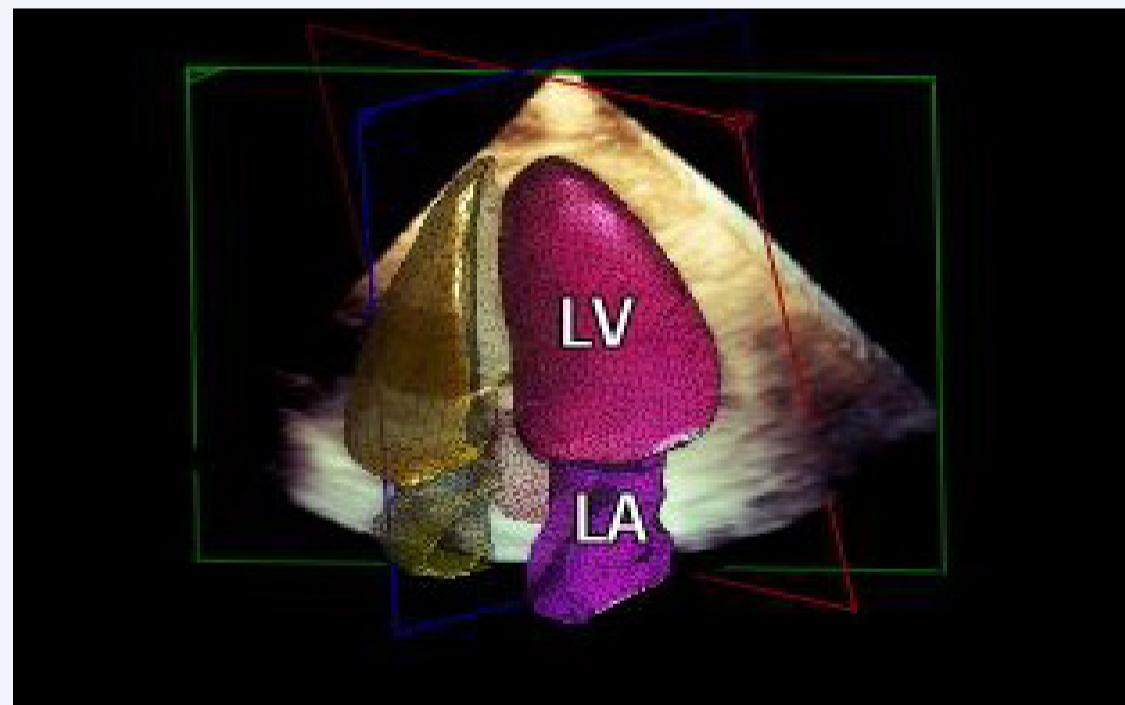


Table 1. Results. LV Quantification Correlation and Agreement

| | Mean | CMR Mean | Correlation (r) | Bias | LOA (2 SDs) |
|-------------------------------|-----------|-----------|-----------------|------|-------------|
| LVEF (%) | | | | | |
| Manual 3DE | 59±12 % | 60±14 % | 0.86 | -1 | 6 (12) |
| HM with no contour adjustment | 63±10 % | 60±14 % | 0.77 | 3 | 9 (18) |
| HM with contour adjustment | 60±13 % | 60±14 % | 0.84 | 0 | 6 (12) |
| EDV (ml) | | | | | |
| Manual 3DE | 105±44 ml | 147±58 ml | 0.89 | -42 | 28 (56) |
| HM with no contour adjustment | 140±45 ml | 147±58 ml | 0.88 | -7 | 29 (58) |
| HM with contour adjustment | 144±52 ml | 147±58 ml | 0.90 | -3 | 23 (46) |
| ESV | | | | | |
| Manual 3DE | 47±38 ml | 64±54 ml | 0.93 | -17 | 24 (48) |
| HM with no contour adjustment | 55±34 ml | 64±54 ml | 0.91 | -9 | 28 (56) |
| HM with contour adjustment | 62±50 ml | 64±54 ml | 0.94 | -2 | 16 (32) |

CONCLUSIONS

In LV quantification, HM with the slider at the compacted myocardial interface strongly correlates with CMR, with minimal LV volumes underestimation. HM time analysis is contained. HM is accurate and time-saving: it promises to facilitate the integration of 3DTTE-based LV measurements into clinical practice.

REVISITED ROLE OF Q-WAVES ECG IN MYOCARDIAL SCAR ASSESSMENT IN CHRONIC ISCHAEMIC HEART DISEASE

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INTRODUCTION

In common clinical practice Q waves or QS complexes in the absence of QRS confounders are pathognomonic of a prior myocardial infarction (MI) in patients with chronic ischemic heart disease (IHD) regardless of symptoms. Prior MI is characterized by the presence of scar. Cardiac magnetic resonance (CMR) late gadolinium enhancement (LGE) is considered the gold standard for the detection of scar (Figure 1 A, B, C). Aim of this study was to assess the sensitivity and specificity of ECG Q-waves in identifying the presence and location of prior MI as detected by CMR.

METHODS

A retrospective study including 500 patients who underwent both a 12-lead ECG and a 3 Tesla CMR viability study was performed. The sensitivity and specificity of Q-waves ECG criteria (ESC Guidelines 2012) in detecting prior MI was assessed considering, as reference, different minimum percentage of LGE in CMR (LGE>0%, LGE>25%, LGE>50%). Moreover the sensitivity and specificity of wall-specific ECG changes (2+ or 3+ pathological Q-waves in the corresponding wall leads) have been evaluated for anterior, inferior, and lateral walls considering LGE>50% as scar indicator.

RESULTS

The sensitivity and specificity of the ESC ECG criteria for the detection of myocardial infarction were 25% and 91% (LGE>0%), 26.3% and 89.1% (LGE>25%) and 27.8% and 86.4% (LGE>50%). The sensitivity and specificity of wall-specific ECG changes in presence of 2+ pathological Q-waves (LGE>50%) were 42% and 88% (anterior wall), 43% and 69.9% (inferior wall) and 28.6% and 76% (lateral wall) while in presence of 3+ pathological Q-waves they were 24% and 95% (anterior wall), 27.8% and 82.5% (inferior wall) and 9.5% and 93.8% (lateral wall) (Table 1 and 2).

Figure 1. Cardiac magnetic resonance late gadolinium enhancement : A)LGE>0% B)LGE>25% C)LGE>50%

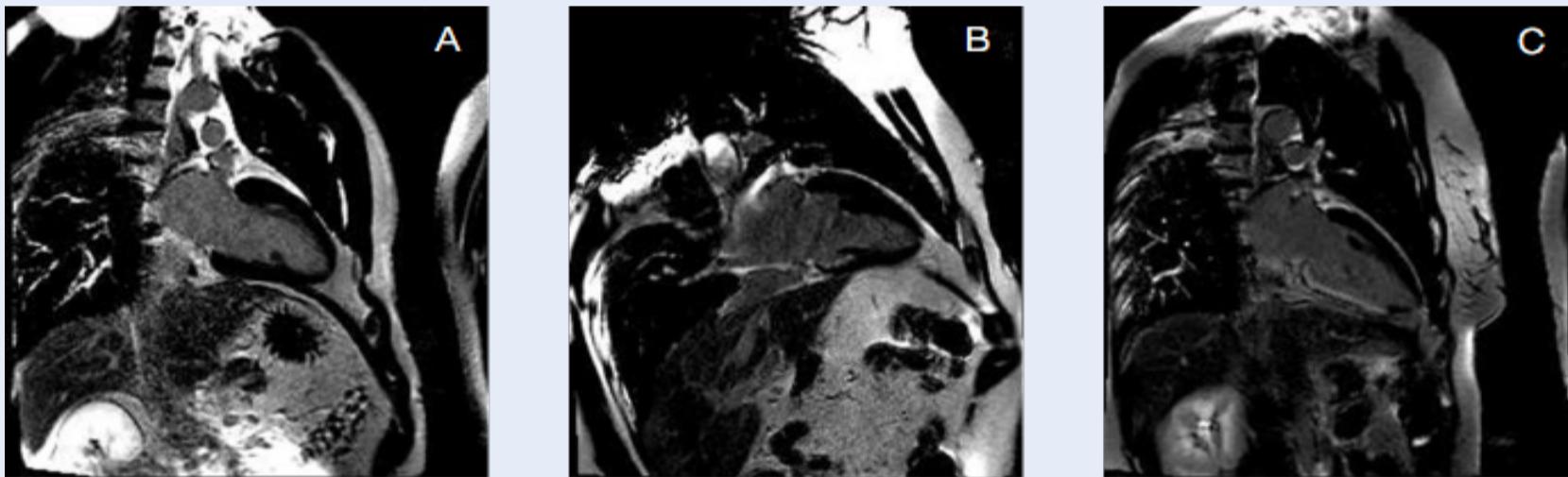


Table 1. Sensitivity and Specificity of the ESC ECG criteria

| SCAR (%LGE) | Sensitivity pathological Q-waves | Specificity pathological Q-waves |
|-------------|----------------------------------|----------------------------------|
| LGE > 0% | 25 % | 91 % |
| LGE > 25% | 26.3 % | 89.1 % |
| LGE > 50% | 27.8 % | 86.4 % |

Table 2. Sensitivity and Specificity of wall-specific ECG changes

| SCAR (%LGE > 50) | Sensitivity > 2 pathological Q-waves | Specificity > 2 pathological Q-waves | Sensitivity > 3 pathological Q-waves | Specificity > 3 pathological Q-waves |
|-----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Anterior wall (V1-V4) | 42 % | 88 % | 24 % | 95 % |
| Inferior wall (D2-D3-aVF) | 43 % | 69.9 % | 27.8 % | 82.5 % |
| Lateral wall (D1-aVL-V5-V6) | 28.6 % | 76 % | 9.5 % | 93.8 % |

CONCLUSIONS

This study suggests that Q-waves ECG criteria for detecting prior MI in patients with chronic IHD may be a poor marker to assess presence, location and severity of myocardial scar.

ANATOMIC CHARACTERIZATION OF CAVOTRICUSPID ISTMUS BY 3D TRANSESOPHAGEAL ECHOCARDIOGRAPHY BEFORE TRANSCATHETER ABLATION

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Introduction

Cavo-tricuspid isthmus (CTI)-dependent atrial flutter is common. Even though catheter ablation is the treatment of choice, procedural data vary greatly between patients. Furthermore, which anatomic structures of the CTI have the greatest impact on procedural data remains unclear. This study aimed to prospectively characterize CTI anatomy by three-dimensional transesophageal echocardiography (3D-TEE) to identify CTI anatomic determinants associated with prolonged ablation time.

Methods

- Population:** Thirty-one consecutive patients (mean age 67.3 ± 11.5 years, 22 males, 18 with arterial hypertension, 9 with ischemic heart disease, mean ejection fraction $55.0 \pm 13.7\%$) underwent CTI transcatheter ablation procedure for symptomatic typical atrial flutter.
- Transesophageal echocardiography:** Before ablation, TEE was performed and 3D-TEE images were acquired to evaluate CTI anatomy (Figure 1), using commercially available fully sampled matrix-array TEE transducer and ultrasound system (X7-2t Live 3D-TEE transducer, iE33, Philips Medical Systems, Andover, Mass., USA). With adequate adjustments of the image and rotation of the probe the obtained views allowed to make quantitative and qualitative assessments of CTI anatomy.
- Ablation procedure:** CTI ablation was performed according to standard procedure (8 mm ablation catheter with fixed settings: 65° C, 80 Watts). The end-point of the ablation procedure was achievement of complete CTI bidirectional block persisting for a waiting period of 30 minutes. EP operators were blinded to pre-procedural 3D-TEE data. Ablation was considered difficult for patients in whom ablation time to achieve CTI block was greater than median ablation time (Group 2). When ablation time was below the median, than the procedure was considered straightforward (Group 1).
- Statistics:** Continuous variables were expressed as mean \pm standard deviation. Student t test was utilized for comparisons. Categorical values were stated as absolute and relative frequencies and were compared using Fisher exact test. All tests were 2-tailed. P value <0.05 was considered statistically significant.

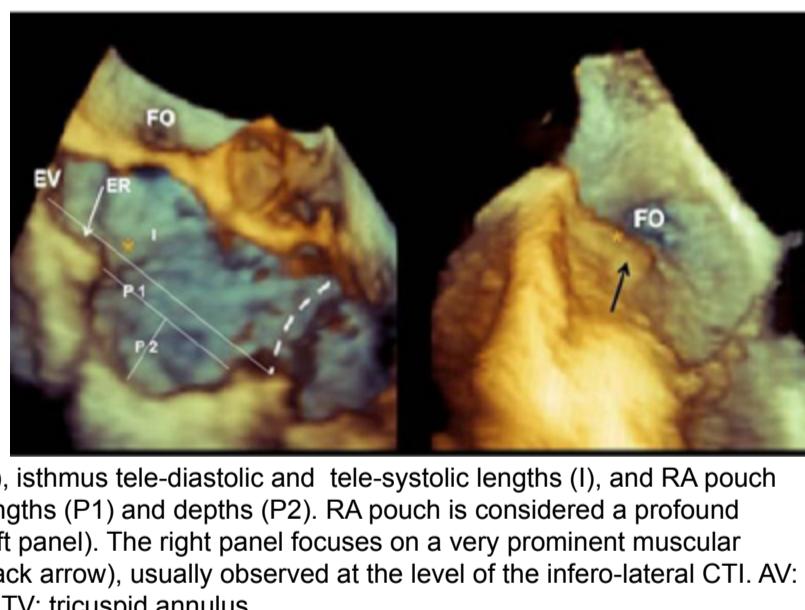


Figure 1. Three-dimensional transesophageal echocardiography (3D-TEE) image of the cavo-tricuspid isthmus (CTI). The CTI is delimited anteriorly by the atrio-ventricular right atrial (RA) groove (dashed line). Main CTI anatomic constituents and the qualitative and quantitative evaluations considered are presented and include Eustachian valve (EV), Eustachian ridge (ER), pectinate muscle (black arrow right panel), isthmus tele-diastolic and tele-systolic lengths (l), and RA pouch tele-diastolic and tele-systolic lengths (P1) and depths (P2). RA pouch is considered a profound depression of the central CTI (left panel). The right panel focuses on a very prominent muscular irregularity, pectinate muscle (black arrow), usually observed at the level of the infero-lateral CTI. AV: aortic valve; FO: foramen ovale; TV: tricuspid annulus.

Results

Bidirectional block of CTI was achieved in all patients without procedural complications after a median ablation time of 11 (IQR 7-14) minutes. Patients with RFA time ≥ 11 min (Group 2) presented lower left ventricular ejection fraction (51.1 ± 17.0 vs $59.5 \pm 6.6\%$, $p < 0.010$), a larger left atrium (46.2 ± 8.4 vs 39.9 ± 9.4 mm, $p < 0.058$), and, more frequently, a right atrial pouch (12/16 patients vs 2/15, $p < 0.01$) compared to patients with RFA time < 11 minutes (Group 1); CTI pouch was significantly deeper in Group 2 compared to Group 1: telediastolic pouch depth was 10.4 ± 4.5 vs 6.3 ± 1.5 mm ($p = 0.003$) and telesystolic depth 12.8 ± 4.4 vs 7.0 ± 1.4 mm ($p < 0.001$), respectively. Telediastolic isthmus length, prominent pectinate muscle and presence of an Eustachian ridge did not differ between the 2 groups (Figure 2).

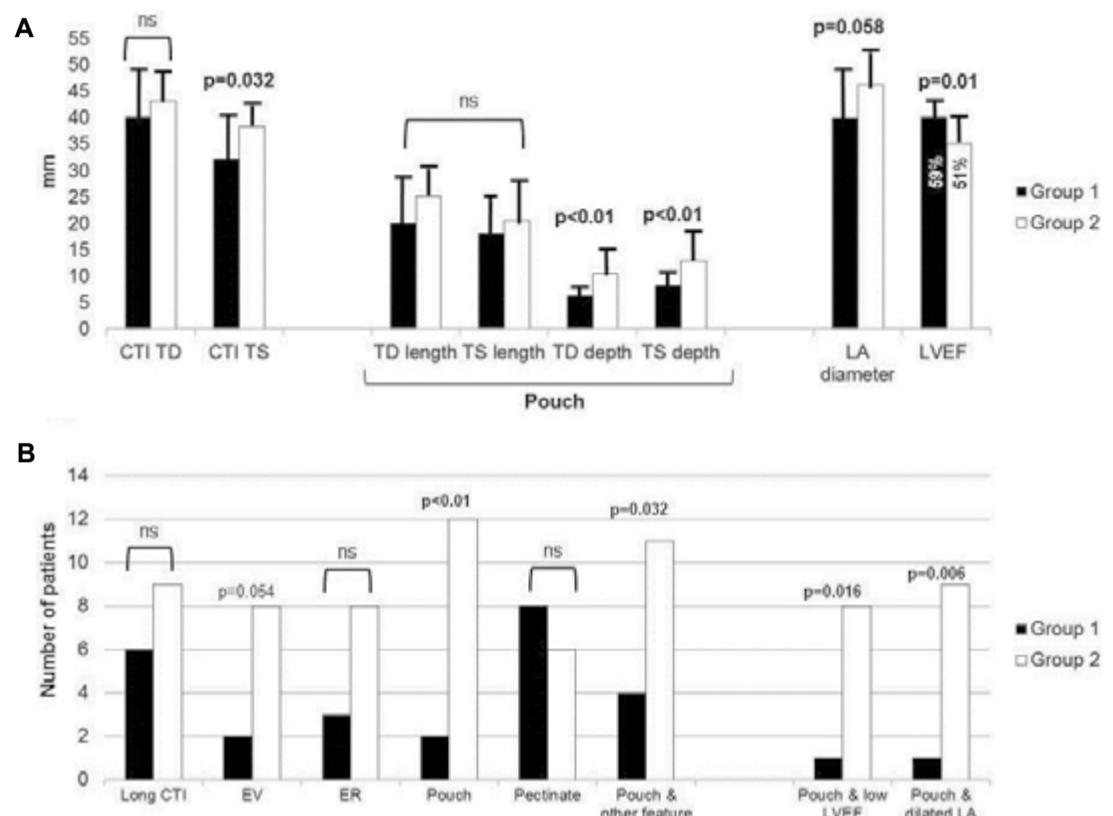


Figure 2. A: Comparative measures with corresponding SD of CTI length and pouch size between patients with straightforward (group 1, black columns) and patients with prolonged radiofrequency ablation (RFA) time (group 2, white columns). B: Comparative qualitative assessment of prominent anatomic CTI features, and corresponding structural and morphological associations, between patients with straightforward (group 1, black columns) and those with prolonged RFA time (group 2, white columns). “Pouch” is considered a profound CTI depression with TS depth ≥ 8 mm, based on the inferior SD margin around the mean TS depth value of the whole cohort. Long CTI is considered Telediastolic CTI length above the median length > 41 mm; low LVEF is considered below the median value of 55%; dilated LA is considered median LA antero-posterior telediastolic diameter > 43 mm. CTI: cavo-tricuspid isthmus; EV: Eustachian valve; ER: Eustachian ridge; LVEF: left ventricular ejection fraction; LA: left atrium; TD: tele-diastolic; TS: tele-systolic.

Conclusions

This study demonstrated that routine pre-procedural 3D TEE imaging is extremely helpful in the qualitative and quantitative evaluation of CTI anatomy. Specific anatomic features, such as deep right atrial pouch, were found to be associated with significantly prolonged CTI ablation time to achieve bidirectional block in patients undergoing RFA for symptomatic typical atrial flutter. This cardiac imaging modality is already well integrated in the current workflow of patients undergoing RFA of CTI, and may therefore provide valuable information to the electrophysiologist for guiding transcatheter ablation (Figure 3).

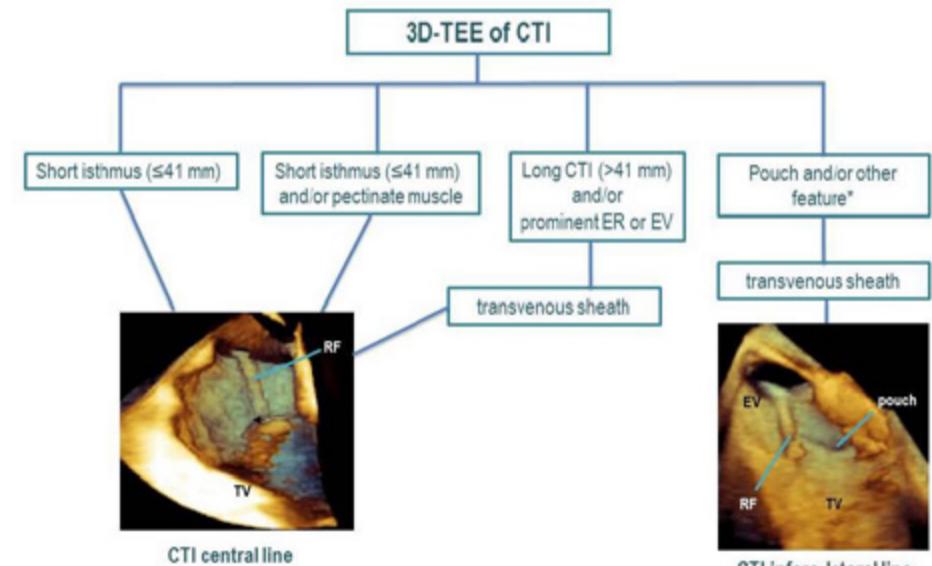


Figure 3. 3D-TEE-guided ablation of CTI in typical atrial flutter. 3D-TEE: three-dimensional transesophageal echocardiography; CTI: cavo-tricuspid isthmus; ER: Eustachian ridge; EV: Eustachian valve; LVEF: left ventricular ejection fraction; RF: radiofrequency ablation catheter; TV: tricuspid annulus.

IMPLEMENTAZIONE E VALUTAZIONE DI STRATEGIE PER MIGLIORARE LA SICUREZZA DELLA TERAPIA ENDOVENOSA IN CURE INTENSIVE

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INTRODUZIONE

Al fine di ridurre gli errori dovuti alla somministrazione di farmaci per via endovenosa, nel 2015 è stato introdotto nell'unità di terapia intensiva del Cardiocentro un doppio controllo indipendente durante la preparazione della terapia endovenosa (figura 1). Inoltre ad ogni cambio turno abbiamo codificato una verifica della correttezza della terapia

in corso al posto letto del paziente. Per l'implementazione è stata sviluppata una strategia multifattoriale (workshop, reminder, materiale informativo e questionario per esplorare le conoscenze-considerazioni-proposte). Durante il 2016 è stato monitorato il rispetto del nuovo standard di sicurezza attraverso indicatori di processo e di esito (tabella 1).

RISULTATI

Sono state analizzate 911 somministrazioni di terapia (444 bolo endovenoso e 467 pompa d'infusione) e 449 verifiche al cambio turno in un campione casuale di 31 giorni nel 2016. Gli indicatori di esito mostrano un trend lineare di riduzione degli errori e/o non conformità nella terapia durante l'anno, da un massimo del 17% ad un minimo del 7% ($p=0.03$) (grafico 1). Il rispetto del doppio controllo della terapia ev. in pompa è progressivamente migliorato nel tempo ($p<0.01$) (grafico 2). La frequenza

del doppio controllo della terapia al cambio turno è passata dal 46.1% del 1° trimestre al 67.5% del 4° trimestre ($OR\ 2.42\ 95\%CI\ 1.45 - 4.03;\ p<0.05$) (grafico 3). Il cambio turno pomeriggio/notte è risultato il meno aderente a quest'ultimo standard di sicurezza ($OR\ 2.50\ 95\%CI\ 1.69 - 3.69;\ p<0.05$). Inoltre dai questionari anonimi emerge un'aumentata percezione di sicurezza degli infermieri nella somministrazione della terapia ev. e aderenza alla direttiva (grafico 4).

Grafico 1 - Indicatore di esito: percentuale di errori e non conformità nella preparazione e somministrazioni delle terapie endovenose durante il primo anno di implementazione del DOUBLE CHECK

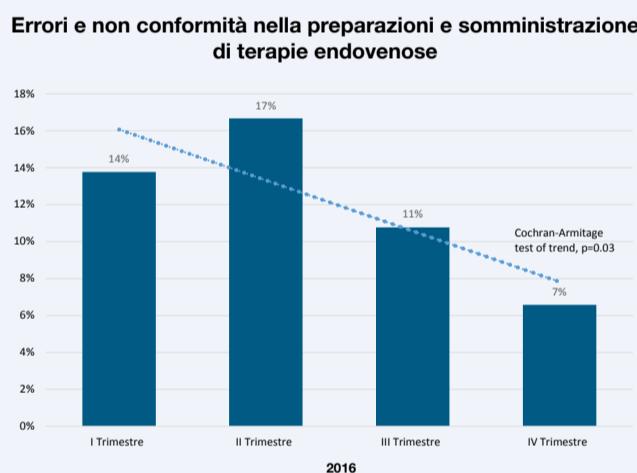


Grafico 2 - Indicatore di processo: percentuale di terapie farmacologiche ev. in pompa per le quali è stato richiesto il doppio controllo (presenza doppia firma sull'etichetta)

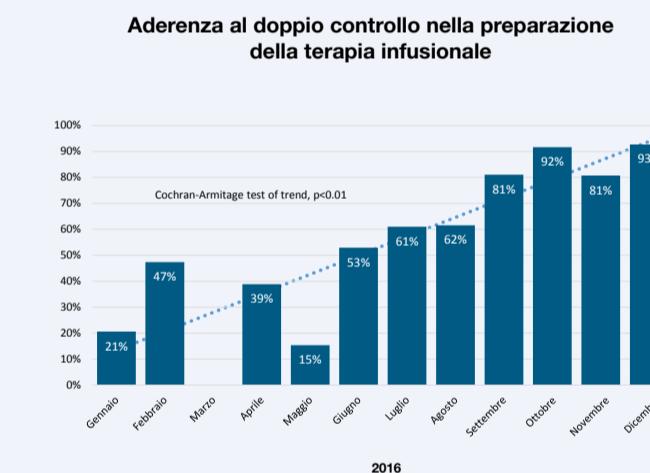


Grafico 3 - Indicatore di processo: percentuale di doppio controllo della terapia ev. al cambio turno

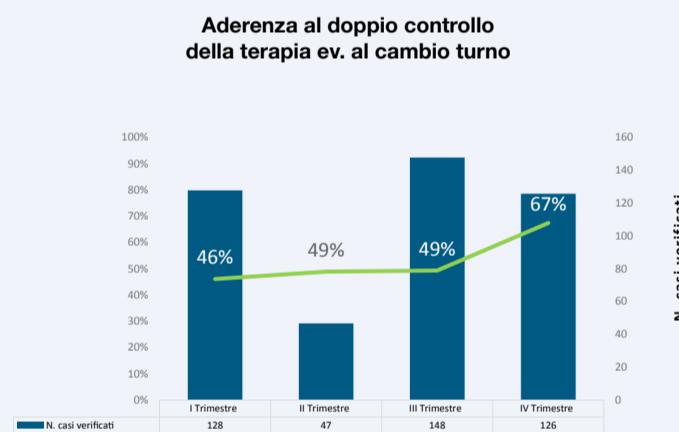


Grafico 4 - Risultati questionari anonimi 2016 vs 2017

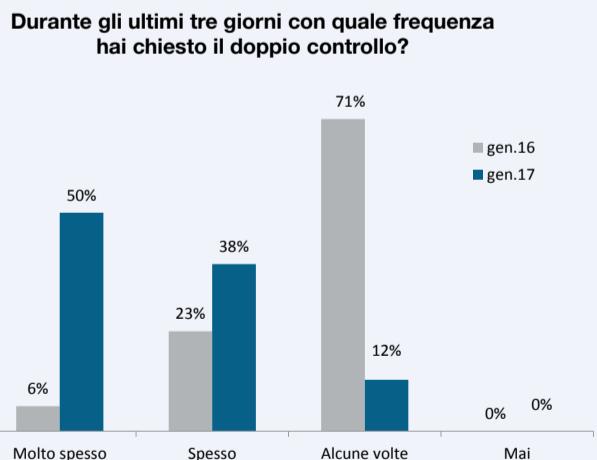


Grafico 4 - Risultati questionari anonimi 2016 vs 2017

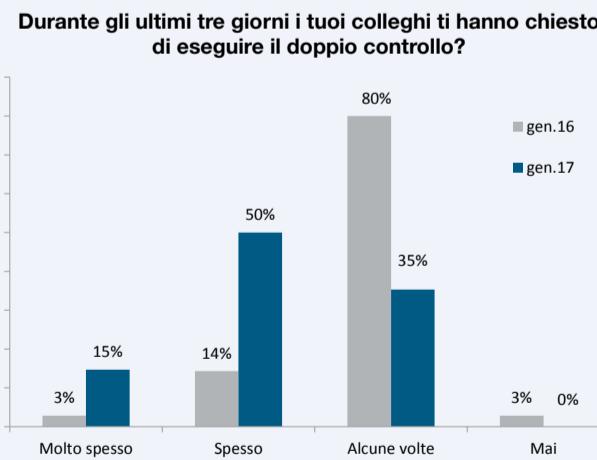


Grafico 4 - Risultati questionari anonimi 2016 vs 2017

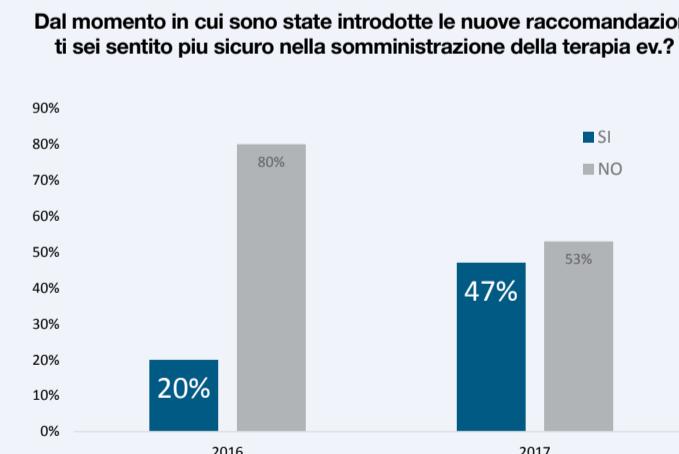


Tabella 1 – Tipologia di errori e non conformità nella preparazioni e somministrazione terapie endovenose rilevate con l'audit nel 2016

| Tipo | Descrizione | Commento | Esempio |
|--|---|--|--|
| Incongruenza non intenzionale tra la prescrizione e la terapia somministrata | Omissione di terapia e/o somministrazione di terapia senza prescrizione | Quando possibile è stato chiesto chiarimento all'infermiere (es. situazioni di cura in progressione) | Furosemide 20 mg. ev. somministrata e registrata sul foglio di sorveglianza ma non indicata nelle prescrizioni |
| Dose non corretta | Somministrazione di una dose di farmaco differente dalla prescrizione | - | Prescrizione di Metamizolo 1gr. e somministrazione di 500 mg. |
| Tempo di somministrazione sbagliato | Differenza di $\pm 2h$ tra l'orario prescritto e quello di somministrazione | - | Acido clavulanico e amoxicillina somministrato 2 ore dopo rispetto a quanto prescritto |
| Incompatibilità fisico-chimica | Incompatibilità fisico-chimica di farmaci in infusione endovenosa alla Y-site | Riferimento allo schema EOC per le compatibilità alla Y-site | Amiodarone in infusione continua alla Y-site con morfina ed eparina sodica |
| Preparazione sbagliata | Diluizione, concentrazione, etichetta non conforme allo standard del reparto oppure assenza di firma e/o data di preparazione | - | Nessuna firma sulla pompa siringa di noradrenalina |

CONCLUSIONI

I risultati ottenuti mostrano come le modalità di doppio controllo per la preparazione e somministrazione della terapia endovenosa e la verifica della terapia al cambio turno hanno portato ad una significativa riduzione delle non conformità. Questa conclusione rappresenta un forte messaggio per la sicurezza del paziente e di motivazione per i curanti.