

# Knowledge of Coronary Stents, Thrombosis, and Dual Antiplatelet Therapy Among Spanish Dentists

Íñigo Lozano, Dolores Martín, Francisco Torres, Pablo Avanzas, Juan Rondán, José M. García-Ruiz, Ernesto Hernández, Jeremías Bayón, José M. Vegas, and Antonio Espolita

Servicio de Cardiología, Hospital Universitario Central de Asturias, Oviedo, Asturias, Spain

**Introduction and objectives.** The coexistence of heart and dental disease is common and antiplatelet therapy with aspirin and clopidogrel following a percutaneous intervention can interfere with dental practice. Our aim was to study dentists' knowledge of percutaneous coronary interventions and their approach to affected patients.

**Methods.** A questionnaire was used to evaluate the knowledge of 100 randomly selected dentists in Spain about coronary stents, antiplatelet therapy, and guidelines prepared by American medical societies, including the American Dental Association, and to determine how frequently they consulted a cardiologist.

**Results.** Data were collected from 100 dentists. Of these, 17 had no knowledge of coronary stents, but only one did not interrupt dual therapy: 12 consulted a cardiologist and the remaining 4 discontinued therapy themselves. Of the 83 who knew about stents, only 28 (34%) understood the difference between bare metal and drug-eluting stents. The drug clopidogrel's name was known by 21%, while 60% recognized one of the drug's commercial names and 45% recognized the other. Of the 83 aware of stents, 48 (58%) knew of the possibility of stent thrombosis, but only 3 knew about possible mortality. Cardiologists were consulted before dental procedures in 83% of cases. Only 36% knew about the existence of the guidelines.

**Conclusions.** Although Spanish dentists' knowledge of coronary interventions was limited, in the majority of cases a cardiologist was consulted before a patient taking dual antiplatelet therapy was treated. Only a small percentage of those questioned knew of the existence of American medical society guidelines.

**Key words:** *Thrombosis. Stent. Aspirin. Platelet aggregation inhibitors. Surgery*

## Grado de conocimiento de *stents* coronarios, trombosis y doble antiagregación entre los odontólogos en España

**Introducción y objetivos.** La coexistencia de afección cardiaca y dental es frecuente y la antiagregación con aspirina y clopidogrel tras intervencionismo percutáneo puede interferir en la práctica de los odontólogos. Se estudia su grado de conocimiento del intervencionismo coronario percutáneo y la actitud ante estos pacientes.

**Métodos.** Se seleccionó de forma aleatoria a 100 odontólogos de nuestro país y, mediante cuestionario, se estudió el conocimiento sobre *stents* coronarios, medicación antiagregante, frecuencia de consulta al cardiólogo y conocimiento del documento de recomendación diseñado por las sociedades médicas americanas, incluido el de la American Dental Association.

**Resultados.** Se registró información de 100 odontólogos; 17 no conocían los *stents* coronarios, pero solamente uno no suspendía la doble terapia, 12 consultaban al cardiólogo y los 4 restantes la interrumpían ellos mismos. De los 83 que conocían los *stents*, solamente 28 (34%) conocían la diferencia entre *stent* convencional y farmacoactivo. El nombre clopidogrel era conocido por el 21%, una marca comercial por el 60% y la otra por el 45%. De los 83 que conocían los *stents*, 48 (58%) conocían la posibilidad de trombosis de *stent*, pero sólo 3, su mortalidad. El cardiólogo es consultado en el 83% de los casos antes de la actuación del odontólogo y el 36% sabe que existe el documento mencionado.

**Conclusiones.** Aunque el conocimiento del intervencionismo coronario es limitado entre los odontólogos, en la mayoría de los casos se consulta al cardiólogo ante un paciente con doble antiagregación. La existencia del documento de las sociedades médicas americanas es conocido en un porcentaje bajo de los encuestados.

**Palabras clave:** *Trombosis. Stent. Aspirina. Inhibidores de agregación plaquetaria. Cirugía.*

Correspondence: Dr. I. Lozano.  
2132 Piles-Infanzón. 33203 Gijón. Asturias. España.  
E-mail: imlml9@hotmail.com

Received June 5, 2008.  
Accepted for publication October 24, 2008.

## INTRODUCTION

Dental and coronary diseases are highly prevalent in industrialized countries and often present in the same patient. After percutaneous interventions with drug-eluting stents, prolonged periods of dual antiplatelet therapy with aspirin and clopidogrel are

often needed. The risk of hemorrhage with this therapy may interfere with dentists' daily practice.<sup>1</sup> Stent thrombosis has been associated with mortality rates of 15%-45% depending on the series.<sup>2-4</sup> In Spain, it has been shown to have a 3-year cumulative incidence of 2% with drug-eluting stents.<sup>4</sup> It has been reported that interrupting antiplatelet treatment to carry out dental treatment has led to stent thrombosis.<sup>5</sup> Due to the increasing use of drug-eluting stents and the need for longer periods of dual antiplatelet therapy, the American Heart Association, the American College of Cardiology, the Society for Cardiovascular Angiography and Interventions, the American College of Surgeons, the American Dental Association, and the American College of Physicians presented a consensus document in January 2007 which underscored the risks of premature termination of dual antiplatelet therapy.<sup>6</sup> It also provided recommendations on the use of such medication in procedures where there was a risk of bleeding in patients fitted with coronary stents.<sup>6</sup> accordingly, the Hemodynamics and Interventional Cardiology Section of the Spanish Society of Cardiology carried out several initiatives to extend knowledge of these issues among health care professionals who might have to deal with complications arising from the discontinuation of dual antiplatelet therapy. The purpose of this study was to determine how well-informed dentists in Spain were on percutaneous coronary interventions and to describe the routine management of coronary patients receiving dual antiplatelet therapy who undergo a minor dental intervention.

## METHODS

The study was cross-sectional in design.

### Sample Selection and Data Collection

We randomly selected 2 dentists from each of 50 Spanish provinces from a list on the internet White Pages. The dentists selected were told the purpose of the study and the name of the coordinating hospital. Any dentist who did not wish to participate was replaced by another dentist from the same province who was also selected at random. Candidates were selected initially by choosing the first 2 to appear in alphabetical order, beginning with a different letter of the alphabet in each province. If it was not possible to include a given candidate for any reason, the next dentist on the list for that province was identified using the same procedure. Data was collected by telephone through March and April 2008, using a 14 item questionnaire survey (Table 1). Interviews were conducted by 2 resident physicians from the cardiology service who received detailed instructions

**TABLE 1. Questionnaire Content**

---

Do you know what a coronary stent is?
Do you know the difference between a conventional and a drug-eluting stent?
Do you know what the active ingredient of Plavix® is?
Do you know what the active ingredient of Iscover® is?
Do you know what clopidogrel is?
Do you suspend treatment with aspirin before a procedure in your patients?
Do you suspend treatment with clopidogrel before a procedure in your patients?
Do you consult with a cardiologist before interrupting medication?
Do you ever wait until antiplatelet treatment is completed before performing the intervention?
Do you know the consequences of interrupting treatment with clopidogrel in a stented patient?
Do you know how frequently thrombosis occurs after suspending treatment with clopidogrel in a patient with a conventional stent?
Do you know how frequently thrombosis occurs after suspending treatment with clopidogrel in a patient with a drug-eluting stent?
Do you know the mortality rate associated with stent thrombosis?
Are you aware of the guidance document produced by the American medical societies?

---

on how to administer the interview. The only information collected on respondents was their name, phone number, and province. This information was used only to track participants and was kept strictly confidential.

## Definitions

A minor dental intervention was defined as repairs or extraction, carried out under local anesthesia, with no need for sutures. No information was collected on surgical procedures so as not to increase the length of the survey and because they were supposed to be minor procedures. Minor procedures are both the most frequent and the ones which are most likely to generate uncertainty on how to proceed if the patient is receiving dual antiplatelet therapy.

## Statistical Analysis

The statistical analysis was carried out using version 15.0 of SPSS.

## RESULTS

A total of 136 dentists were contact to achieve the required sample of 100. The other 36 refused to participate.

## Coronary Stents and Thrombosis

Of the 100 dentists included, 17 had no knowledge of coronary stents. Of the 83 who had some knowledge of stents, only 28 (34%) knew the difference between a conventional stent and a drug-eluting stent and, while 48 (58%) were aware of the risk of stent thrombosis, only 3 knew of the possible mortality associated with it. Finally, 36% of respondents were aware of the existence of the American scientific societies' guidelines.

### Clopidogrel and Suspension of Antiplatelet Therapy

Only 21% of respondents recognized the name of the active ingredient. However, 60% recognized one of the drug's commercial names and 45% recognized the other.

Of the 17 respondents who had no knowledge of coronary stents, one stated that he/she would perform minor dental interventions without suspending antiplatelet treatment, 4 indicated that they would suspend antiplatelet treatment, and 12 stated that they would consult a cardiologist before proceeding.

Of the 83 who had some knowledge of coronary stents, 71 stated that they would consult a cardiologist before proceeding with the dental intervention. Of the 12 who did not say they would consult the cardiologist, half would suspend drug treatment and the other half would not. Table 2 shows the principal study results.

## DISCUSSION

In this descriptive, cross-sectional study, we investigated Spanish dentists' knowledge of coronary stents and their attitude towards patients receiving dual antiplatelet treatment. The principal results were that: *a*) almost 85% of those surveyed had some knowledge of coronary stents; *b*) they were not very well-informed on drug-eluting stents, and particularly on the consequences of thrombosis; *c*) relatively few of the respondents recognized the commercial names for clopidogrel, and even fewer recognized the active ingredient; *d*) a high percentage of those surveyed would consult with a cardiologist before carrying out a dental intervention; and *e*) most were unaware of the document produced by the United States medical societies, including the American Dental Association. Dual antiplatelet therapy with aspirin and clopidogrel is part of usual treatment for a high percentage of cardiac patients. While such therapy is essential for at least 1 month after implantation of a conventional stent,<sup>7</sup> and is also recommended for 9-12 months after acute coronary syndrome without ST segment elevation,<sup>8</sup> the real problem arises with drug-eluting stents,

TABLE 2. Results

Total number of dentists surveyed (n=100)	
Aware of the existence of stents	83
Aware of clopidogrel	21
Aware of commercial name 1	60
Aware of commercial name 2	45
Aware of the American guidance document	36
Consults with a cardiologist	83
Knowledge of stents (n=83)	
Able to differentiate between conventional and drug-eluting stents	28
Awareness of the possibility of thrombosis with stents	48
Knowledge of mortality associated with thrombosis	3
Consult with a cardiologist	
Yes	71
No	12
Interrupt antiplatelet treatment	6
Do not interrupt antiplatelet treatment	6
No knowledge of stents (n=17)	
Consult a cardiologist	
Yes	12
No	5
Interrupt antiplatelet treatment	4
Do not interrupt antiplatelet treatment	1

which require this type of medication for at least 1 year.<sup>7</sup> In the latter case, there is a substantial risk of late stent thrombosis if treatment is prematurely withdrawn. In fact, the most important risk factor for this event is withdrawal of dual antiplatelet therapy; an earlier study showed such withdrawal to increase the risk by 57 times (95% confidence interval, 15-220).<sup>3</sup> The fact that dental and heart disease commonly present together means that dental interventions are often necessary in patients with coronary disease. The ease with which local compression can be performed and the frequent need for dental interventions in this population suggests that management should be tailored accordingly. However, while consensus exists on the management of patients receiving oral anticoagulation treatments, there is less consensus on the management of patients receiving antiplatelet therapy. The 2 most widely used oral anticoagulants are acenocoumarol, which is most frequently used in Europe, and warfarin, which is more common in the United States. The main difference lies in the half-life; the prothrombin rate takes 3 days to normalize with acenocoumarol compared to 5 days with warfarin.<sup>9</sup> There have been several studies on the risk of bleeding with oral anticoagulants in dental interventions.<sup>10-12</sup> It is recommended that oral anticoagulation should not be withdrawn and that INR should be maintained at <4 in the case of dental extractions and minimally invasive surgery. In interventions in which there is significant risk of

bleeding, INR should be  $<3$ , and interventions should be delayed where  $\text{INR} > 5$ . Local solutions, such as sponges with thrombin inhibitors or local fibrinolysis inhibitors such as tranexamic acid, can be used. In some countries, such as Germany, it is even possible to directly consult the National Thrombosis Service.<sup>13</sup>

Recommendations regarding antiplatelet agents were much less clear until recently. In some reviews of cardiovascular disease in patients undergoing dental procedures, coronary stents are not even mentioned<sup>14</sup> while others on drug-derived coagulation problems in the same patients do not mention clopidogrel.<sup>15</sup> Finally, although there is a considerable literature on the use of antiplatelet monotherapy,<sup>16</sup> the literature on dual antiplatelet therapy is scarce,<sup>17</sup> especially as regards clopidogrel. In some cases, antiplatelet and anticoagulant medications have been grouped together as blood thinners, thereby incorrectly treating them as if they belonged to the same class of medications.<sup>6</sup>

In our study, although almost 85% of respondents were aware of coronary stents, only a small percentage were aware of the existence of drug-eluting stents, and most were unaware both of the risk of thrombosis with this type of stent, and of its consequences. The percentage of professionals who recognized the name of clopidogrel either as an active ingredient or through one of its brand names was also rather low. Finally, the guidance document issued by American medical societies, including the American Dental Association,<sup>6</sup> was known to only a third of the dentists interviewed. However, despite their rather limited knowledge on these issues, most of the dentists interviewed indicated that they would consult with a cardiologist when treating a patient with a history of heart disease. This would help to better assess the risks and benefits involved with total or partial suspension of dual antiplatelet therapy. The aforementioned guidance document also summarizes a series of measures which can be very effective in preventing thrombosis. Interventional cardiologists are recommended not to implant drug-eluting stents in patients who cannot follow dual antiplatelet therapy over a prolonged period of time or who will undergo surgery in the following months. Clinical cardiologists are recommended to provide appropriate advice at discharge and to ensure that patients are adequately followed up. In fact, it has been shown that lack of information at discharge and lack of appropriate follow-up by the cardiologist are both associated with stopping dual antiplatelet therapy.<sup>18</sup> Providing adequate information would help to ensure that patients inform the dentist regarding the medication they are taking and its importance. Finally, the same document also

stresses that health care professionals, in this case dentists, who will be performing invasive treatment in these patients should inform the cardiologist of the procedure to ensure that management is appropriate.

In the same vein, the Hemodynamics and Interventional Cardiology Section of the Spanish Society of Cardiology carried out a series of activities designed to extend knowledge of the problem among dentists, anesthesiologists, and primary care physicians. More specifically, in relation to the group studied here, a letter was sent to dental colleges as well as to all members of those colleges in April 2007, stressing the importance of the problem and the need for adequate recommendations. The letter also mentioned the existence of the American guidance document. A further leaflet was circulated in February 2008 which contained the same information in graphic form. Another initiative was to give each patient a card with information on the implanted stent, the date and location of the implant, and scheduled medication.

All of these initiatives can be found on the webpage [www.hemodinamica.com/pagina\\_ppal/index.asp](http://www.hemodinamica.com/pagina_ppal/index.asp), under "Novedades" and can be downloaded in either Spanish or English. Although we did not collect data on whether the dentists in our study had received any of this information, our results show only limited awareness of the problems associated with treating patients who have received a coronary stent and suggest that it might be advisable to circulate relevant information on a regular basis. Initiatives of this type can be carried out at relatively low cost and can help to considerably reduce the scale of the problem.

## Limitations

The fact that some questions used yes/no answers might introduce bias into the interpretation of the responses, although when 2 questions referred to the same aspect, greater weight was given to the response which included quantitative information.

## CONCLUSIONS

Although Spanish dentists' had some knowledge of coronary interventions and stents, most were not aware of the differences between conventional and drug-eluting stents. Knowledge of the consequences of interrupting dual antiplatelet therapy was also limited. A high percentage of those surveyed said they would consult a cardiologist before carrying out a dental procedure in patients receiving dual antiplatelet therapy. Only a small number of dentists knew of the guidance document produced by the American medical societies.

## ACKNOWLEDGMENTS

The authors acknowledge the collaboration of all the dentists consulted. Without their help this study would not have been possible.

## REFERENCES

1. Elad S, Chackartchi T, Shapira L, Findler M. A critically severe gingival bleeding following non-surgical periodontal treatment in patients medicated with anti-platelet. *J Clin Periodontol*. 2008;35:342-5.
2. Cutlip DE, Baim DS, Ho KK, Popma JJ, Lansky AJ, Cohen DJ, et al. Stent thrombosis in the modern era: a pooled analysis of multicenter coronary stent clinical trials. *Circulation*. 2001;103:1967-71.
3. Iakovou I, Schmidt T, Bonizzoni E, Ge L, Sangiorgi GM, Stankovic G, et al. Incidence, predictors, and outcome of thrombosis after successful implantation of drug-eluting stents. *JAMA*. 2005;293:2126-30.
4. de la Torre-Hernandez JM, Alfonso F, Hernandez F, Elizaga J, Sanmartin M, Pinar E, et al. Drug-eluting stent thrombosis: results from the multicenter Spanish registry ESTROFA (Estudio Espanol sobre TROMbosis de stents FArmacoactivos). *J Am Coll Cardiol*. 2008;51:986-90.
5. van Werkum JW, Heestermans AA, Jaarsma W, Hautvast RW, de Boer MJ, ten Berg JM. Thrombosis of a coronary stent after discontinuing treatment with clopidogrel. *Ned Tijdschr Geneesk*. 2006;150:863-8.
6. Grines CL, Bonow RO, Casey DE Jr, Gardner TJ, Lockhart PB, Moliterno DJ, et al. Prevention of premature discontinuation of dual antiplatelet therapy in patients with coronary artery stents: a science advisory from the American Heart Association, American College of Cardiology, Society for Cardiovascular Angiography and Interventions, American College of Surgeons, and American Dental Association, with representation from the American College of Physicians. *J Am Dent Assoc*. 2007;138:652-5.
7. King SB III, Smith SC Jr, Hirshfeld JW Jr, Jacobs AK, Morrison DA, Williams DO, et al. 2007 Focused Update of the ACC/AHA/SCAI 2005 Guideline Update for Percutaneous Coronary Intervention: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines: 2007 Writing Group to Review New Evidence and Update the ACC/AHA/SCAI 2005 Guideline Update for Percutaneous Coronary Intervention, Writing on Behalf of the 2005 Writing Committee. *Circulation*. 2008;117:261-95.
8. Anderson JL, Adams CD, Antman EM, Bridges CR, Califf RM, Casey DE Jr, et al. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines for the Management of Patients With Unstable Angina/Non ST-Elevation Myocardial Infarction): developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons; endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine. *Circulation*. 2007;116:e148-304.
9. Llau JV, de Andres J, Gomar C, Gomez-Luque A, Hidalgo F, Torres LM. Anticlotting drugs and regional anaesthetic and analgesic techniques: comparative update of the safety recommendations. *Eur J Anaesthesiol*. 2007;24:387-98.
10. Devani P, Lavery KM, Howell CJ. Dental extractions in patients on warfarin: is alteration of anticoagulant regime necessary? *Br J Oral Maxillofac Surg*. 1998;36:107-11.
11. Giglio J. Complications of dentoalveolar surgery. In: Kwon P, Laskin D, editors. *Clinician's manual of oral and maxillofacial surgery*. 3rd ed. Chicago: Quintessence. 1997. p. 271-2.
12. Little JW, Miller CS, Henry RG, McIntosh BA. Antithrombotic agents: implications in dentistry. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2002;93:544-51.
13. Brugemann J, Van Gelder IC, van der MJ, Zijlstra F. Cardiological (pharmaco) therapy and dental practice. *Ned Tijdschr Tandheelkd*. 2006;113:75-81.
14. Greenwood M, Meehan JG. General medicine and surgery for dental practitioners. Part 1: cardiovascular system. *Br Dent J*. 2003;194:537-42.
15. Lockhart PB, Gibson J, Pond SH, Leitch J. Dental management considerations for the patient with an acquired coagulopathy. Part 2: Coagulopathies from drugs. *Br Dent J*. 2003;195:495-501.
16. Partridge CG, Campbell JH, Alvarado F. The effect of platelet-altering medications on bleeding from minor oral surgery procedures. *J Oral Maxillofac Surg*. 2008;66:93-7.
17. Shah PR, Yepes JF, Valenza JA. Combination of aspirin and clopidogrel for the prevention of thrombosis: implications for the dental practitioner. *Gen Dent*. 2007;55:517-22.
18. Spertus JA, Kettelkamp R, Vance C, Decker C, Jones PG, Rumsfeld JS, et al. Prevalence, predictors, and outcomes of premature discontinuation of thienopyridine therapy after drug-eluting stent placement: results from the PREMIER registry. *Circulation*. 2006;113:2803-9.