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DENTAL IMPLANT IDENTIFICATION BASED ON ARTIFICIAL INTELLIGENCE

BY SPOTIMPLANT

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About Spotimplant

Spotimplant is an award-winning HealthTech startup founded in 2019. Spotimplant is a dental implant restoration assistant based on Artificial Intelligence (AI). Our solution allows dentists to identify an unknown implant, find compatible prosthetic components, and learn about technical specifications. Our mission is to combat medical device obsolescence and ensure the sustainability of implant systems.

Introduction

A prosthetic or a biological complication or even an esthetic defect may prompt the dentist to intervene on an unknown dental implant. To enable the treatment, it is important to know the model, brand, and diameter of the implant to order the correct prosthetic components and associated screwdrivers. For this reason, and given the thousands of implants on the market - which include more than 300 brands, 3500 models, and 25,000 references - traceability is not always well guaranteed. It is therefore impossible for a general practitioner to recognize them all. (1) As shown in a recent study published on JOMI in 2020, 79.9% of clinicians surveyed reported having encountered the problem of an unknown dental implant (2).

Therefore, this case study aims to illustrate the solution to the problem of identifying unknown dental implants through the use of Spotimplant's AI-based technology.

Case Presentation

The patient is a 35-year-old woman whose tooth had to be extracted 5 years ago due to a recurrent infection. The tooth was replaced with an implant abroad, but the prosthesis was never placed. When she arrived at the implantology department of Toulouse University Hospital (France), the patient had the healing screw in her mouth and the implant was perfectly osseointegrated. However, to consider a prosthetic restoration, it is necessary to know the model, diameter, and brand of the implant. Unfortunately, in this case, traceability was not properly kept and the patient could not remember any information about her implant. If such information cannot be retrieved, the osseointegrated implant may be removed, which implies a very invasive procedure for the patient. Consequently, after a concise diagnosis, Spotimplant's identification service was solicited.

Identifying the implant

To identify the implant that had already been placed, a periapical radiograph was taken and submitted to Spotimplant, the dental implant identification platform.

To be processed properly, the JPEG image must be as orthogonal and clear as possible, target only one implant at a time from head to apex, and be exported directly from the imaging software, as shown in Figure 1. A few questions are then asked to collect additional information such as: country, year of implantation, etc.

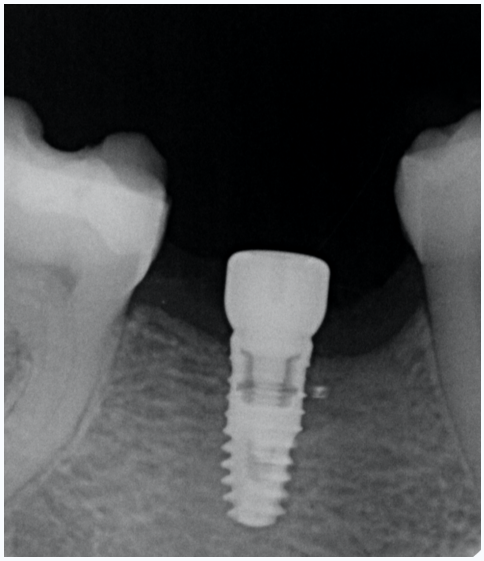
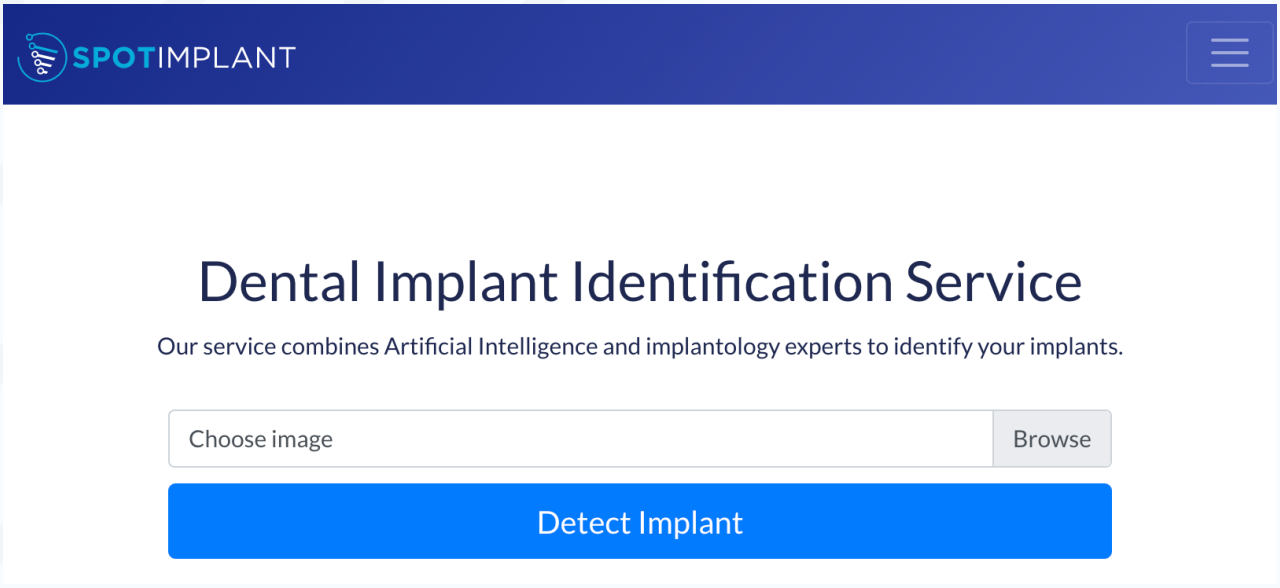
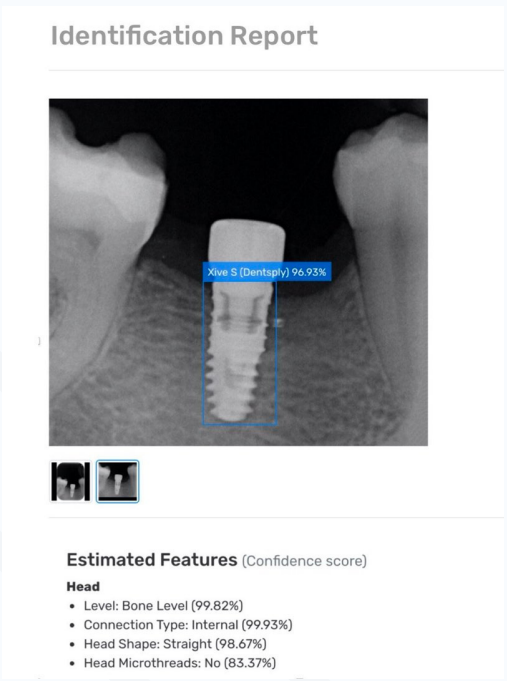
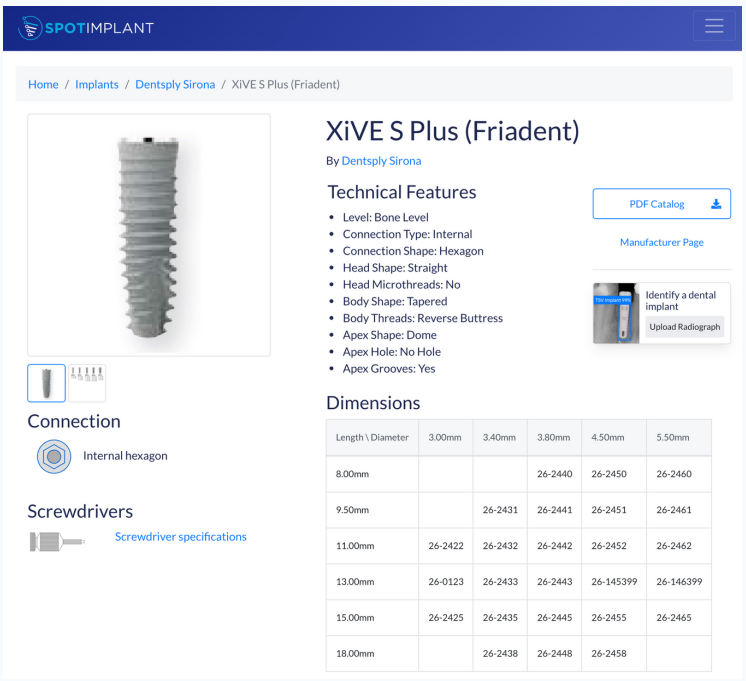


Fig. 1. Orthogonal and clear periapical radiograph of an implant

The identification report was returned to the dentist within 24 hours. This report is performed by a hybrid system composed of artificial intelligence and controlled by implantology experts (Figs. 2, 3, 4).







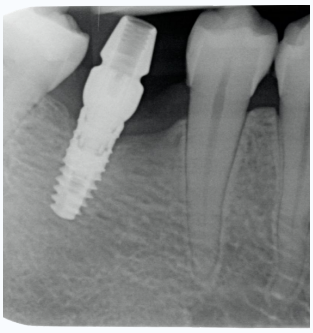
Figs. 2, 3 & 4: Results given by the Spotimplant platform after implant identification

[Click here to see a sample identification report]

The identification report includes a list of the most likely implant alternatives, all based on probability scores. This allowed the dentist to make a decision on the final identification, review the technical specifications and finally order the right components to start the prosthetic treatment, and finally initiate the following specific steps:

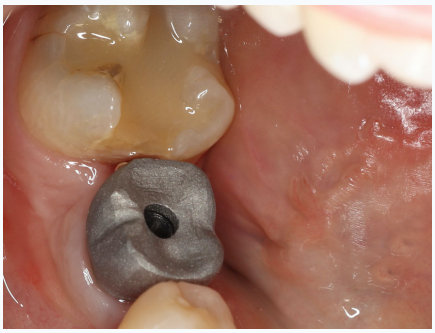
Restoration

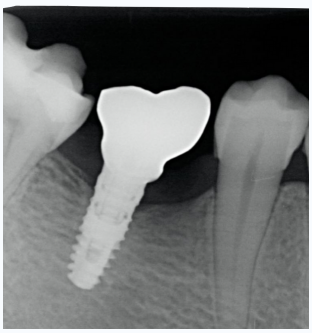
First, the impression transfer was attached and a radiograph was taken to verify the fit (Figs. 5 & 6).



Figs. 5 & 6: Screwing of the impression transfer and verification

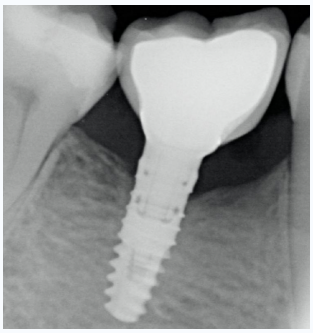
Then, the impression was taken and the abutment along with the metal framework were tried in (Figs. 7 & 8).





Figs. 7 & 8: Try-in the abutment and metal framework

Once set, the shade of the adjacent teeth was taken into account to create the crown of the implant and adjust the occlusion (Figs. 8 & 9).



Figs. 8 & 9: Crown placement and adjustment of the occlusion

Conclusion

Spotimplant's AI-based identification tool was used to identify implant references and determine technical specifications. With this valuable information, the prosthetic restoration could be planned and the compatible components ordered. This allowed the treatment to be carried out smoothly, with a satisfactory outcome (Fig. 10).

Fig. 10: Final result

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Disclaimer

Spotimplant is not a medical device and does not claim to be one. Spotimplant does not provide any medical diagnoses. Dentists are responsible for making medical diagnoses about how to treat patients. Spotimplant only provides technical information about implant products (implant features, screwdriver specifications, etc.).

References

(1) Jokstad A, Braegger U, Brunski JB, Carr AB, Naert I, Wennerberg A. Quality of dental implants*. Int Dent J. 2003;53(S6P2):409–43

(2) A pilot survey on the prevalence of clinical challenges to identify and restore unknown dental implants , Robert Douglas Walter, D.D.S. ; Journal of Oral Implantology, Feb 2020