Ancient skeleton in India bears evidence of leprosy

Claudia Salwiczek

LEIPZIG, Germany: The oldest known skeleton showing signs of leprosy has recently been found in India and may help unravel the myth of where the disease originated. In the journal *PLoS ONE*, Assistant Professor Gwen Robbins, an anthropologist at Appalachian State University in the US, and researchers in India describe a middle-aged adult male skeleton demonstrating signs of leprosy in skeletal material, such as tooth loss and root exposure.

Historians have long considered the Indian subcontinent to be the source of the leprosy that was first reported in Europe in the fourth century B.C., shortly after the armies of Alexander the Great returned from India.

The 4,000-year-old skeleton was found near Udaipur in north-western India. The authors say their find confirms that a passage in the Atharva Veda, a set of Sanskrit hymns written around 1550 B.C., indeed refers to leprosy. The bacterium that causes leprosy seemed to have spread worldwide from a single clone, biologists reported three years ago. But because of insufficient samples, they could not determine whether the bacterium was disseminated when modern humans first left Africa about 50,000 years ago or spread from India in more recent times.

Dr Helen D. Donoghue, an infectious disease specialist at University College London, said the finding was fascinating and fits in with the theory that Alexander’s army had brought leprosy back from its campaigns in India.

Leprosy is still common in many countries, especially in temperate, tropical, and subtropical climates. India has the largest number of leprosy patients in the world. The number of new cases of leprosy recorded by official services was 158,000 in 2007, but there are some two to three million people who have had to endure the disabilities caused by leprosy throughout their lives.

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae* that affects almost 250,000 people worldwide. It is not very contagious and has a long incubation period, which makes it difficult to determine where or when the disease was contracted.

Leprosy has two common forms, tuberculoid and lepromatous. Both forms produce sores on the skin, but the lepromatous form is the most severe, producing large, disfiguring nodules (lumps and bumps).

All forms of the disease eventually cause peripheral neurological damage, which results in sensory loss in the skin and muscle weakness. People with long-term leprosy may lose the use of their hands or feet, owing to repeated injury resulting from a lack of sensation.

Effective medications exist, and isolation of victims in ‘leper colonies’ is unnecessary. The emergence of drug-resistant *Mycobacterium leprae* and an increased number of cases worldwide have led to global concern about this disease.

Editorial note: For the original article, please go to: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0005669.
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Creating consistent results in aesthetic dentistry is certainly the ultimate goal that every clinician wants to achieve. However, achieving this result and patient satisfaction can be elusive at times. Because aesthetic restorative dentistry is artistic in nature, there is much subjectivity in fabricating the final aesthetic result.

Creating beautiful direct resin restorations requires the clinician to perform equally well on a range of tasks. The clinician has to consider all aspects present in the patient’s smile zone, from gingival architecture to tooth contour, from colour to surface texture, in order to create the ideal result. On a conceptual level, having an understanding of the final result is one thing, choosing the ideal technique and executing the process is another. In all circumstances, the direct resin application technique is so versatile that the clinician can add, reduce, polish and re-polish the composite veneering material until the desired outcome is achieved.

Clinicians have seen the revolution in composite material science and techniques since the advent of the acid etch technique in 1955. The development of hydrophilic dentine bonding agents has further added to restorative possibilities. The significant advantage of modern direct adhesive composite systems is that they allow clinicians to preserve sound tooth structure during the removal of caries and preparations compared with traditional restorative procedures.

The new composite restorative Tetric N-Ceram (Ivoclar Vivadent) features aspects of nanotechnology: ‘nano additives’ that help material sustain a good viscosity and polishability have been incorporated. Further organic pigments covalently bonded to silicon dioxide particles in a nanoscale range enable an outstanding colour match with natural tooth structure, and thus give outstanding aesthetic results clinically. Tetric N-Flow (Ivoclar Vivadent) with nano-optimised technology complements this composite resin, helping the clinician to achieve a predictable aesthetic result clinically. The nano-filled, light-cured, single-component total-etch adhesive Tetric N-Bond (Ivoclar Vivadent) ideally complements the Tetric N-Family products.

The objective of this article is to introduce the clinical application of the new Tetric N-Ceram, Flow and Bond. The rationale behind the clinical technique and intricate application methods is also discussed.

Clinical case
A young patient, a 16-year-old boy, presented with large cervical and proximal carious lesions on all maxillary and mandibular anterior teeth. (Figs. 1 & 2) All these lesions were surrounded by white hypocalcified enamel lesions. The patient presented a history of restorations on these in past that failed over time. Clinically, it was also observed that there was chronic gingival inflammation, evidenced by hyperplastic gingiva with bleeding from marginal areas.

After proper evaluation, the priority was to achieve good gingival health and contour.
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After thorough prophylaxis under local anaesthesia, deep gingival scaling and gingival re-contouring was done. The patient was instructed regarding proper brushing and plaque control measures, using Cervitec Gel (Ivoclar Vivadent) at home to achieve good gingival health.

A reasonable gingival health was achieved after about ten days and a restorative treatment was scheduled. After gingival retraction, complete caries was excavated with high-speed diamond burs and slow-speed round burs. Soft hypocalcified enamel was removed as well. A flame-shaped, high-speed diamond bur and coarse polishing discs were used to prepare the margins in the cervical area, extending to the complete labial surface of the tooth. On the labial surface, about 0.8 to 1 mm of enamel was reduced, in order to preserve the natural enamel left on the tooth. A short bevel was placed on the cervical preparation and on the Class III preparation at the DE junction area. Preparations were thoroughly rinsed with water (Fig. 5).

Restorative technique

The restorative plan included restorations of the involved carious lesions (Class V and Class III restorations), followed by direct veneering with Tetric N-Ceram composite material. Shade selection was done, and two maxillary central incisors were chosen for the restoration. Preparations were etched with 37% phosphoric acid gel Total Etch (Ivoclar Vivadent) for 15 seconds (Fig. 4). Neighbouring teeth surfaces were protected by covering them with Teflon tape. The teeth were rinsed and air-dried but not to the point of desiccation.

Next, the bonding agent Tetric N-Bond was applied on enamel and dentine (Fig. 5). After about 20 seconds, the preparation surfaces were air-dried with a gentle blast of air and light-cured for 10 seconds using the bluephase C8 LED light (Ivoclar Vivadent) in LOP mode. A small layer of flowable composite Tetric N-Flow was placed in the deep proximal and cervical areas where dentine was exposed and was spread with a thin brush, followed by light curing for 20 seconds using the bluephase C8 light in SOF mode.

Tetric N-Ceram composite restorative shade A3.5 dentine was placed in the proximal and on the cervical areas, to replace the natural dentine (Fig. 6). This dentine shade composite material was also manipulated over the short bevel area, to hide the margin between the enamel and dentine. This was light-polymerised for 20 seconds using the bluephase C8 light in SOF mode. Next, Tetric N-Ceram A2 enamel shade was placed on top of this dentine shade of composite and contoured properly (Fig. 7), followed by light curing for 20 seconds. The A1 enamel shade was placed from the middle third of the preparation until the incisal third and spread well with Optrasculpt (Ivoclar Vivadent) and light-cured for 20 seconds. After this, a final transparent composite shade T was placed in the middle third and spread as a very thin layer on the entire labial surface and the incisal surface with a one-way brush. The whole surface was given a smooth anatomy with a sable brush. This layer of composite was light-cured for 20 seconds. Finally, the entire restoration was subjected to final polymerisation for 10 seconds each on the labial, palatal and cervical areas using the bluephase C8 light in HIP mode.

After completing the primary anatomy of the two central incisors, all the remaining lateral incisors and canines were restored with the same technique. Subsequently, all mandibular anterior teeth were restored in the same way.

For this case, as gingival health was comparatively poor initially at the time of developing this restoration (because of the presence of caries and no control over the accumulation of plaque), the final finishing and polishing, in order to develop the secondary anatomy, was delayed until the following appointment a week later.

Finishing and polishing

For finishing and polishing, 12-fluted carbide and diamond finishing burs were used. Thereafter, the Astropol (Fig. 8) and Astrobrush System (both Ivoclar Vivadent; Fig. 9) were employed to impart a high lustre, whilst maintaining the existing created texture and surface anatomy. Astrobrush System was used with a slow-speed motion without pressure. The whole procedure was repeated after modifying the restoration according to the patient’s requirements.

Conclusion

When done properly, composite restorations can be long lasting and beautiful, appearing as real as nature intended. Today’s technological advances of materials, such as Tetric N-Ceram’s shade variety and strength, and the polisheshability of composite resin allow clinicians to close spaces, transform spaces and enhance colours with minimal removal of tooth structure, as we can appreciate in the Figures 10 and 11.

Contact Info

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“You can take someone out of India but you can never take India out of them”

Interview with Prof. Raman Bedi, United Kingdom

Prof. Raman Bedi is one of many dentists of Indian origin working in other parts of the world.

Daniel Zimmermann: Prof. Bedi, you were Chief Dental Officer for the UK from 2002 to 2005. What are you doing at the moment?

Prof. Raman Bedi: I consider my time spent as CDO a real privilege and loved the job but have also never looked back. When I was asked to be CDO, I was thrilled and keen to meet the challenge. But in 2006, when the opportunity came for me to lead the Global Child Dental Health Taskforce, whose mission is supported by the World Health Organization (WHO), the choice was simple. I am now living out the dream that had at the start of my career and this is very satisfying and fulfilling.

I knew that I would be a paediatric dentist from my second undergraduate year. I remember writing to David Barnes, then head of the Oral Health Unit at WHO in Geneva, asking him for a job. He was kind enough to take the time to respond and pointed out that if this was a career option then I should gain postgraduate qualifications and about 20 years experience before applying to WHO—quite daunting feedback for a 21-year-old dental student!

The current CDO, Barry Cockersett, recently said in an interview with our sister publication in the UK that public dentistry has improved significantly in Britain. Do you agree with him?

It is not easy to be a public figure and a spokesperson for Government policy. There are deep-rooted constraints and market in which it is provided, so the remuneration of dentists is critical.

You are the founder of Dentalghar, a new worldwide community for dentists of Indian origin. What is the purpose behind this community?

It is simply responding to a global movement that is occurring within the Indian Diaspora. I was born in India, but my parents migrated when I was two years of age. Similar to me, there is a large community of people of Indian origin who have decayed teeth extracted is more than a concern, it is blight on the public policy landscape.

It is also fair to point out that this is not just true of England but of nearly every developed country. Oral health has improved but the gap in inequalities remains, and to the question are we doing enough for children, the answer has to be no. If the quest is about dentistry as a whole, then yes this has improved but to the same level as it has done in other countries?

I will simply say that dental care is much influenced by the proximity whose physical links with the subcontinent—but not emotional ones—were severed. There is a saying in India: you can take someone out of India but you can never take India out of them.

I noticed that our medical colleagues were organising themselves and linking up with their counterparts in India. They have established joint ventures, conferences and collaborative training opportunities. In dentistry, proportionately speaking, we have more dentists of Indian origin worldwide than our medical colleagues, and so this factor gave rise to the drive to start Dentalghar. It is, if you will, a response to a need.

Are there any requirements for joining the group?

The organisation is not a campaigning one, and the particular issue of work permits has not been discussed by members. We simply bring people together and if certain issues come up then members might want to respond as individuals.

What I have noticed is that many dentists are asking how they can help or volunteer in India. Others are reconnecting with their roots (that is, the towns where their families originated) and asking what dentistry is like there. So in fact, the interest is reversed and directed towards India.

How many dentists of Indian origin are currently working abroad?

This is very difficult to determine, as there has not been a global census. We do know that India has over 25 per cent of all dental schools in the world and that in the UK, US and Australia, a sizable proportion of dental students have their ancestral roots in the subcontinent. The Ministry of Indian Affairs estimates that there are over 1 million healthcare professionals worldwide who have Indian origins, a proportion of which are dentists. At Dentalghar, we conservatively estimate that 20 per cent of dentists worldwide have Indian origins.

You are of Indian origin yourself but as I understand, you became involved in dentistry here in the UK.

Indeed, my parents were part of the large migration from India to the UK that occurred in the late 1950s and 1960s. They had little experience of Higher Education, and so my brothers and I entered university life with very little background information or guidance as to what subjects we should choose. It was also at a time when professional career advice was hard to obtain. And thus, I drifted into dentistry with very little understanding of what to expect. In spite of this somewhat disadvantaged position, I loved my time at Bristol Dental School and have never regretted the choice I made to study dentistry.

Let me also say at this stage that everyone is welcome to join this virtual community, irrespective of race, ethnic background, religion or gender—in fact, we would welcome a multifaceted community. The focus is on the subcontinent (Pakistan, India, Nepal, Bangladesh and Sri Lanka) and the diverse ‘Asian’ dental communities that have sprung up in regions as far apart as the US, Canada, UK, South Africa, Singapore, Middle East and Australia—the list goes on wherever after that, I am out of my depth. This is a virtual community engaging through the Internet; thus, I needed to have partners who had IT expertise and understood the dental market and publishing. Smile-on had this combination and I had worked with the company before, so it was an obvious choice for me to team up with them.

Does the organisation also help dentists from India with work permits, visas etc.?

“Eye on India: Middle East and Australia—Quite daunting feed-back around my PC by myself but

Does the organisation also help dentists from India with work permits, visas etc.?

Prof. Raman Bedi
The outsourcing sector attracts professionals from all sectors; dentistry just one of them. Many new graduates work in dental practice but supplement their income by working at BPO centres for a few hours each week.

I was in India two months ago and met 50 deans of dental schools, who came to engage with the Global Child Dental Health Taskforce project. They shared their concerns about dental employment for their future graduates. What is needed in India is a national workforce strategy that is carefully devised and implemented.

**What are the main reasons that dentists leave the country?**

In the past, it was for employment and training. Now, for many, India is an attractive place to live and work, with increasing potential. Overseas postgraduate education is still a strong pull for doctors. But, the situation over the next 10 to 15 years will change dramatically. With higher demands for quality dentistry by local people, dental tourism, postgraduate training opportunities etc., many dentists will stay in India and some may even return.

**Are dentists from India sufficiently trained for service in regions like the UK?**

It is difficult to answer this question. There are many dental schools in India that are excellent, whilst others require modernisation. One thing is certain: the dentists who sit entry exams in regions such as the US or the UK do very well. From my personal experience, the postgraduates I have supervised who trained in India have been outstanding.

**Last year, the House of Lords abandoned guidelines that discriminate against overseas medical graduates. Did this also concern dentistry and, if so, has this decision improved working conditions for Indian dentists in the UK?**

The House of Lords’ ruling was on a very specific case taken up by the British Association of Physicians of Indian Origin (BAPIO). It has more of an impact on those who are medically trained than on those seeking dental training. BAPIO was courageous in making this appeal and it will be seen as a landmark event in race relations within the National Health Service here in the UK. For a minority ethnic organisation to challenge government in the High Court is remarkable and even more so for them to have their case upheld—well unbelievable! But it was the right thing to do. I am proud to have been involved. It will be seen as a landmark event in race relations within the National Health Service here in the UK.

**Did this also concern dentistry?**

Yes, definitely: the dentists who sit entry exams in regions such as the US or the UK do very well. From my personal experience, the postgraduates I have supervised who trained in India have been outstanding. It is difficult to answer this question. There are many dental schools in India that are excellent, whilst others require modernisation. One thing is certain: the dentists who sit entry exams in regions such as the US or the UK do very well. From my personal experience, the postgraduates I have supervised who trained in India have been outstanding.

**Regions like the UK rely heavily on dentists from abroad to sustain their services. What impact do and will foreign doctors have on dentistry in the country?**

Historically, we have relied on overseas-trained doctors and dentists. In 2004, England published a dental workforce strategy to build a home-grown workforce, which is why our dental schools increased their undergraduate numbers by 25 per cent in 2006. In 20 years’ time, we got the numbers wrong, then we know who to blame: I chaired the review!

Thank you very much for the interview.

**We have more dentists of Indian origin worldwide than our medical colleagues**

The newspaper the Times Of India recently reported that many dental graduates in India have to leave dentistry to work in more lucrative jobs, such as in the Business Process Outsourcing sector (BPOs). With more than 270 dental institutions in the country, is there an overflow of dental professionals in India right now?