Canal Projection – A Technique for the Management of Badly Mutilated Teeth: Case Reports

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Isolating a severely broken down tooth is a considerable challenge. Due to insufficient tooth structure either the rubber dam placement becomes difficult or the dam leaks. Coronal bonded build-up can simplify the endodontic phase and strengthen the tooth, decreasing the possibility of further damage to the tooth due to the rubber dam clamp or mastication. The canal projection technique allows for isolation of the individual canals bringing them to the cavosurface margin. This offers adequate visualization and convenience for instrumentation as straight line access is achieved and also provides a strong core and coronal seal of the operative field. In these case reports management of badly broken down teeth was done by canal projection technique using plastic delivering tips and hypodermic needles as projectors. Composite core build up was done, which helped in rubber dam placement.

Key Words: Canal projection, Core build-up, Isolation, Monoblock, Mutilated teeth

The effectiveness of cleaning and shaping the root canal system is compromised if there is a lack of good coronal seal. It is important to achieve an effective seal with a rubber dam to prevent salivary contamination during root canal preparation.[1] Insufficient tooth structure prevents the placement of a clamp. The clinician must first determine whether these teeth are periodontally sound and restorable.[2]

Management of severely broken down teeth can be done by various methods like special clamps with prongs extending apically[3], using S-G clamps,[2] clamping adjacent teeth for multiple tooth isolation, placing clamp beaks on gingival tissue, periodontal crown lengthening to expose more tooth structure to facilitate clamp placement,[3] use of flexible copper band, temporary crown or orthodontic band, pin retained amalgam buildups, glass ionomer cement or composite buildups. Building up the coronal tooth structure following caries removal and identification of the canal orifices can facilitate the endodontic process, providing a strong core and coronal seal.[4]

The canal projection technique using the Projector Endodontic Instrument Guidance System (PEIGS) (CJM Engineering, Santa Barbara, CA, USA) provides pre-endodontic reconstruction of debilitated coronal and radicular tooth structure whilst preserving individualized access to canals.[5] This article reports two cases where the management of badly broken down teeth was done using plastic tips and hypodermic needles as projectors for extending the orifices on the cavosurface and providing a strong core for clamp placement and coronal seal.

CASE REPORTS

Case 1

A male of 19 years reported to the Department of Conservative Dentistry and Endodontics, Modern Dental College and Research Centre, Indore, with the complaint of a dull, intermittent pain in the right upper posterior region since 2 months. Intra-oral examination revealed the presence of a grossly decayed tooth, (16) with three walls missing and gingival

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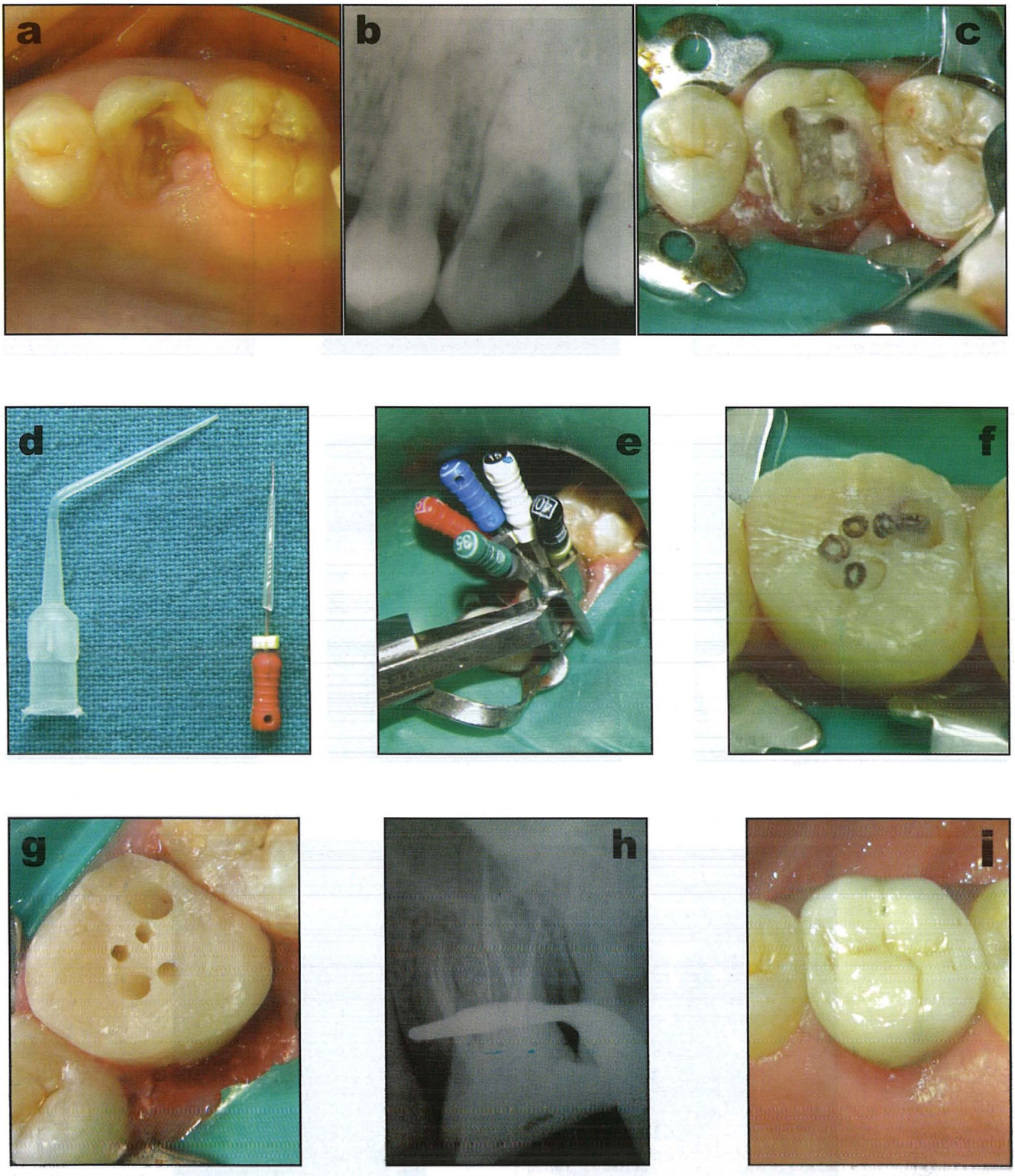


Fig. 1: a) Pre-operative intraoral view. b) Pre-operative radiograph. c) Isolation by split dam technique. d) Plastic delivery tip with modified Projector along with # 25 size K File. e) Plastic projectors snugly fitting into the dimpled orifices with its files. f) Core build up done and files removed. g) Orifices projected to surface. h) Radiograph after obturation and Fibre post cementation. i) Intraoral view after crown placement.

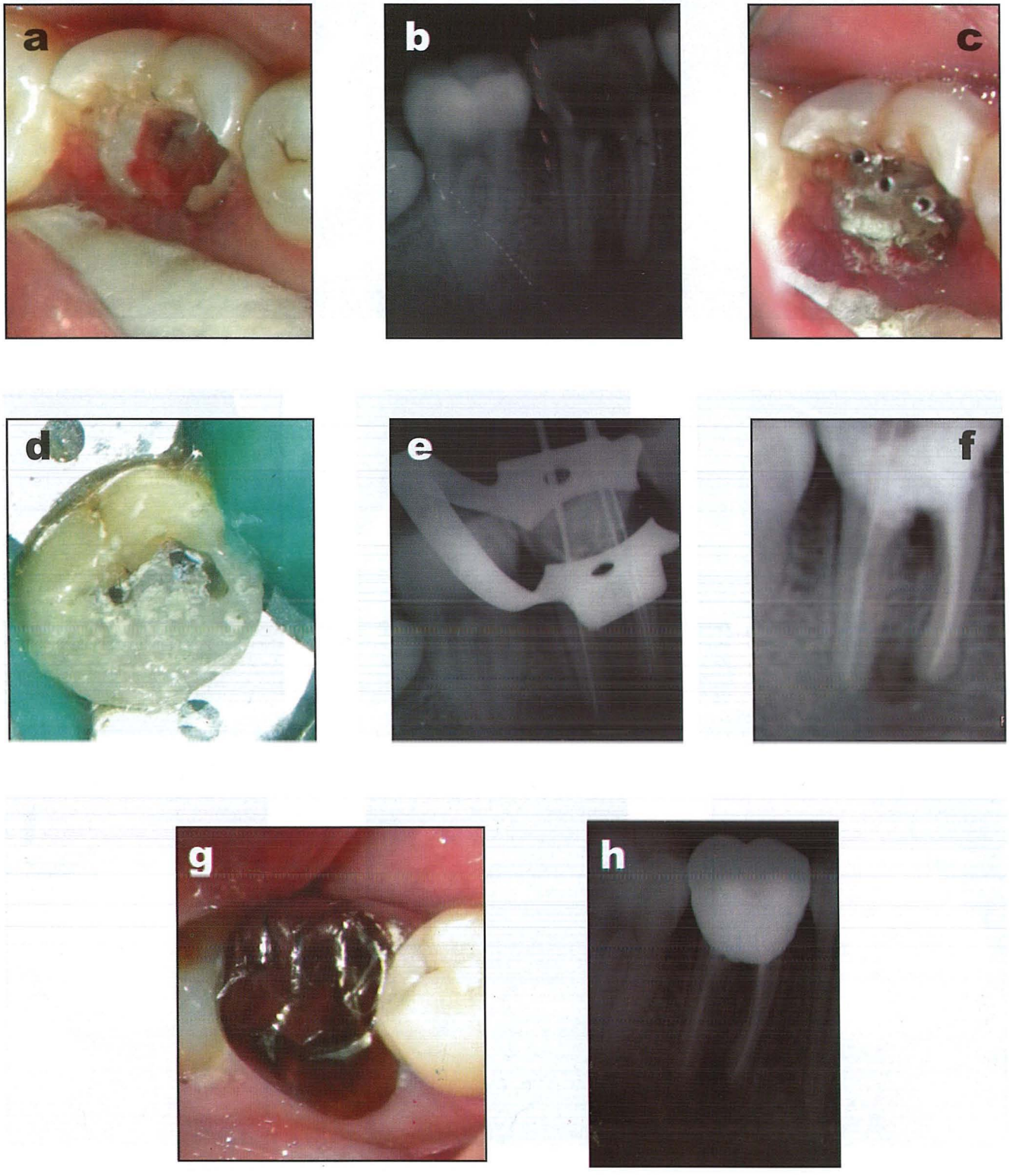


Fig. 2: a) Pre-operative view. b) Pre-operative radiograph. c) MTA placed in furcal area. d) Canals projected on surface. e) Working Length Radiograph. f) Radiograph after Fiber post cementation. g) Intra-oral view after crown cementation. h) Radiograph after 3 months.

overgrowth (Fig. 1a). There was negative response on pulp sensibility testing. The preoperative radiograph (Fig. 1b) revealed deep occlusal caries approaching the pulp and there was periapical radiolucency in connection with palatal root of 16. A diagnosis of pulpal necrosis and chronic periradicular abscess was made.

After surgical crown lengthening, a preendodontic build was planned by using plastic tips as rubber dam isolation was challenging . After securing adequate anaesthesia, rubber dam was applied by split dam technique. Access cavity preparation was performed and five canal orifices were identified (Fig. 1c). The canals were enlarged to a size 20 file and canal orifices were dimpled with a 3# slow speed round bur to facilitate placement of the plastic tips along with the file. Plastic tips were prepared by cutting the apical end till it fit snugly in the orifices. (Fig. 1d) K-Files of different sizes were inserted into the prepared tips so that 5–6 mm of each file tip protruded beyond the tip of the prepared projector and then inserted into its respective orifice. The plastic projectors were pressed into place with cotton pliers until they seated precisely and snugly into the dimpled orifices. (Fig. 1e) A stainless steel band was secured and etching with 37% ortho phosphoric acid was done for 20 seconds. Two to three layers of dentine bonding agent were applied and light-cured individually. The core build-up was done in increments using a hybrid composite.

A size 50 Hedstrom hand file was then used to remove the tips from the core, by rotating it clockwise, to engage the flutes in the lumen of each tip and slowly withdrawing by rotating anticlockwise. The composite build up was checked for high points and finished. Thus, a pre-endodontic build-up with individualized straight line access to each canal was achieved successfully (Fig. 1f). Rubber dam was applied and working length was determined. Canal preparation was done with engine driven NiTi rotary instruments using the crown down technique. Obturation was done with cold lateral condensation technique. Post space was prepared in the palatal canal using Peeso reamers and a glass fiber conical post was cemented with dual cure resin cement to strengthen the composite core build up. (Fig. 1h) Coronal sealing of the projected orifices was done. Patient was recalled after 1 week for follow up and later full coverage PFM crown was placed to complete the rehabilitation. (Fig. 1i)

Case 2

A female of 18 years reported with the complaint of dull, intermittent pain in lower right posterior region since 1 week. Intraoral examination revealed a deeply carious 46 with pulp exposure. (Fig. 2a) Vitality testing gave a negative response. Radiograph revealed pulp involvement and periodontal ligament space widening with distal root along with periapical radiolucency with the mesial root. There was radiolucency present in the furcation area. (Fig. 2b) A diagnosis of pulp necrosis associated with periapical abscess was made. Root canal treatment was planned with pre-endodontic build up using hypodermic needles as projectors, since isolation and clamp placement was difficult. As the floor of the chamber was very thin with perforation at the floor and lingual wall, it was planned to seal the perforation with MTA.

To place MTA in the chamber floor the files were removed slowly not disturbing the secured needles in the orifices to aid in visualization and easy instrument manipulation. MTA was mixed according to the manufacturer's instruction and carried with the help of amalgam carrier and placed in the floor and condensed (Fig 2c). After the setting of MTA a stainless steel matrix band was applied and secured with help of a wedge. Incremental composite core build up was done followed by working length determination (Fig.2d& 2e) and cleaning and shaping of the canals. Obturation was done by cold lateral condensation technique. Post space was prepared immediately and fiber post was cemented. (Fig. 2f) Later a full coverage metal crown was placed to complete the rehabilitation. (Fig. 2g & 2h)

DISCUSSION

One of the fundamental biological principles of root canal therapy is to control the infection from the

endodontic space during the entire treatment. This begins with removal of all carious lesion, proper isolation of the treated tooth with a rubber dam, and adequate restoration of remaining tooth structure.[2] But in cases of severely broken down teeth contamination can occur during the restorative process from poor isolation and also due to loss of a temporary restoration or if leakage occurs.[6] Therefore it is necessary to pretreat these teeth, so as to make possible and/or simplify optimal isolation of the operative field.[7]

Rubber dam can be placed on severely broken down teeth by using deep-reaching clamp, placing clamp beaks on anaesthesised gingival tissue, but it causes possible damage to the cementum and periodontium and also reversible post operative discomfort.[2,] Clamping adjacent teeth for isolation i.e. by split dam technique can be done, but meticulous fluid seal is not achieved. In the past, temporary cements, copper bands, orthodontic bands and temporary crowns have been advocated as it protects against cuspal flexure and helps in retaining temporary cement. These methods cannot provide an adequate seal and a pleasing aesthetic result.[8] Moreover these methods are time consuming, and gaining an access runs the risk of introducing and blocking a canal with cement particles.[9] Replacement of missing tooth structure can be accomplished by means of pin-retained amalgam buildups, composite 'donut' technique and glass ionomer cements.[2] Resin bonded composite (RBC) restorations showed a strengthening effect on the tooth structure, with fracture resistance similar to that of unaltered teeth.[10]

In teeth with minimal coronal tooth structure canal projectors can facilitate adequate access and preparation of root canals by literally projecting the canal orifices from floor of the pulp chamber to the cavosurface, so as to visualize and access the canals easily.[11] The Canal Projected core allows isolation of the tooth by surrounding them with a resin buildup.[4] Canal projection is helpful for managing cases of severe coronal breakdown, tipped and/or rotated teeth, patients who have difficulty opening their mouth wide enough, and where the canal orifices on the pulp floor are close together.[11] With the use of improved adhesive system generations in the last decade, alternative techniques to reconstruct severely damaged teeth have been advocated. The main goal of the new composite resin core build-up protocol is preservation and reinforcement of the remaining sound tooth structure.[12]

The canal projection technique offers numerous advantages like:-

- Isolation which is the primary requisite of doing the procedure by enabling clamp placement as the missing walls are constructed.[2]
- Individualization of the canals to make them independent thereby simplifying management of canals lying in close proximity.[2,4]
- Sealing of the patent accessory furcal canal of the chamber floor by composite thereby preventing contamination by ingress of fluids and bacteria from the periodontium or by oral fluids in case of periodontal pockets.[13,]
- Higher bond strength can be achieved between adhesive resin and the pulp chamber floor when a thick layer of unfilled resin is used along the floor of the pulp chamber.[14]
- Elongation of the "hydraulic chamber" of each canal, offering advantages during the hydraulic condensation of obturation material.[2]
- It allows for correction of misdirected access cavities by essentially reconstructing the walls and floors around Projectors which act as 'internal matrix barriers'.[5]
- Also prevents perforation of the thin chamber floor by inadvertent use of files, explorer or bur.[2]

Since the tooth was extensively carious in case 2, MTA was used to seal the furcal and lingual perforation. The use of biocompatible materials to repair perforations is advocated to reduce the incidence of inflammatory reactions in the surrounding tissues. MTA has been used to study the sealing ability for furcal perforations, which lead to cementum formation over the MTA. Also there was no inflammatory cells infiltrate, lowest incidence of epithelium migration when using MTA. The newly formed cementum

fused to the original cementum on the root surface. Furthermore, MTA was insoluble in the presence of moisture.[15]

Posts are used primarily to provide retention for the core material and their indication depends on the dental substance and extent of either destruction or viable tooth structure left after endodontic treatment. In both the cases as there was minimal tooth structure and due to a large core build-up, it was mandatory to insert a post for retaining the composite core material. As fibre posts have a modulus of elasticity very similar to that of dentine, a mechanically homogeneous tooth post–core monoblock could be achieved instead of an assembly of heterogeneous materials. This would help to distribute masticatory loads homogeneously and reduce stresses during function.[16]

Thus crown projection is a useful technique for the treatment of severely broken down teeth. Initially it takes time to construct the core build up but once mastered the technique sensitive steps become easy and less time consuming.[5]

CONCLUSION

Endodontic success is a multifactorial issue. Like a jigsaw puzzle, the full picture can only be seen when all the pieces are fit together, starting from inspection, diagnosis, treatment planning, pre-endodontic restoration, endodontic procedures, coronal sealing and then follow-up visits. Crown projection is a powerful tool enhancing isolation and preventing inter appointment leakage, thus providing a good treatment option to be considered for the management of severely broken down teeth.

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Mid-year convocation of PFA India Section-2012

The Mid Year Convocation of the Pierre Fauchard Academy, India Section was held at the Auditorium of B.P. Koirala Institute of Health Sciences, Dharan, Nepal on Friday August 24, 2012 at 7.30 pm.

The Mid Year Convocation started with Prayer. After the Chairman of the Pierre Fauchard Academy, India Section Prof. Fellow Dr. Hari Parkash, adorned the Chairman's collar, he declared the Convocation "Open". He welcomed the Chief Guest, Guest of Honour, Guests, Fellows and New Inductees, traced the history of PFA and the contributions of Dr. Pierre Fauchard. Prof. Fellow Dr. R.K. Singh introduced the Chief Guest, Prof. Dr. B.P. Das, Vice – Chancellor of B.P. Koirala Institute of Health Sciences, Dharan and the Guest of Honour Prof. Dr. Praveen Mishra, Secretary of Health and Population, Nepal. The Secretary of the Pierre Fauchard Academy, India Section Prof. Fellow Dr. T. Samraj introduced the 11 new Inductees. The new Inductees were awarded the PFA India Section Fellowship Certificates by the Chief Guest, the PFA Medallions by the Chairman, PFA Pins by the Chief Editor of Journal of Pierre Fauchard Academy, Prof. Fellow Dr. V.P. Jalili. The Chairman administered the Pledge of PFA India Section to the new Inductees and admitted them in the India Section of Pierre Fauchard Academy. After felicitations offered by the Guest of Honour, the Chief Guest gave an inspiring address to the newly inducted Fellows, wherein he challenged them to emulate the high professional and ethical standards of Dr. Pierre Fauchard. On behalf of the new inductees, Assistant Prof. Fellow Dr. Varun Pratap Singh responded. After Vote of Thanks by the Secretary and National Anthem, the Chairman declared the Convocation "Closed". The Convocation Ceremony was attended by 120 delegates who also took part in the cocktail Dinner hosted by B.P. Koirala Institute of Health Sciences, Dharan, Nepal. The Convocation Ceremony was compeered excellently by Assistant Prof. Pragya Shrestha and Assistant Prof. Leeza Pradhan.

New Fellows:

1	Dr. Vinay Kumar Bhardwaj
2	Dr. Prabhat Shrestha
3	Dr. Pramita Suwal
4	Dr. Abhishek Kumar
5	Dr. Prabhat Ranjan Pokharel
6	Dr. Varun Pratap Singh
7	Dr. Mannu Vikram
8	Dr. Tri Ratna Bhakta Mamandhar
9	Dr. Dhirendra K. Giri
10	Dr. Dilip Kumar Das
11	Dr. Praveen Mishra



JOURNAL OF PIERRE FAUCHARD ACADEMY, INDIA SECTION
AN APPEAL

The Journal Pierre Fauchard Academy of India Section has completed 26 years of uninterrupted publication. During the last 26 years of its publication the Journal of PFA has received commendable recognition in the scientific forum nationally as well as outside the country. It's new getup and format has been appreciated and well received.

In our efforts to improve and upgrade the Journal, it has been decided to engage professional publisher with effect from 2013. Giving it a facelift with increase of pages to meet the increasing demand from contributors. Financial implications of this venture need not be over emphasised. Therefore, I would like to appeal all the fellows, Heads of Dental Institutions, dental manufacturers, traders and allied companies to voluntarily come forward and extend their helping hand in continued publication of this journal by advertising in it. Colleges will be required to subscribe for the Journal henceforth.

Looking forward for a whole hearted support.

Mid-year Convocation of PFA India Section - 2012





Dignitaries on the dais (L to R): Hon. Secretary Prof. T Samraj, Section Chairman Prof. Hari Parkash, Chief Guest Prof. (Dr.) B.P. Das, Guest of Hon. Dr. Praveen Mishra and JPFA Chief Editor Prof. V.P. Jalili.



Chairman administering the oath to the new inductees.



Awarding fellowship certificate to a new fellow



Address by Prof. (Dr.) Praveen Mishra



Presenting fellowship award to Prof. (Dr.) Praveen Mishra



Inductees with the Dignitaries on Dias

Workshop on Maxillo Facial Prosthodontics
B.P.K.I.H.S. Dharan - Nepal (24th-25th August 2012)



6th International Dental Student Conference, Rishikesh



The Audience



Chief Guest inaugurating the Conference

The 6th International Dental Student Conference organized by the Dental Student Welfare Association of India under the stewardship. Himanshu Aeran and Dr. Chandresh Shukla was held on 3rd and 4th of November 2012 at Seema Dental College, Rishikesh. Nearly 1000 delegates from across the nation attended the conference.

Shri Harak Singh Rawat, Minister of Medical Education, Agriculture and Soldier Welfare, Govt. of Uttarakhand inaugurated the conference and released the Souvenir. The inaugural session was followed by the cultural programme which included spectacular performances by both undergraduate and postgraduate students.

Dr. Bhagwant Singh, Vice President, Asia Pacific Dental Federation inaugurated the scientific session. Dr. G.K. Thakral, chairperson, reception committee gave welcome address. 200 scientific papers and posters work presented. There were 21 guest speakers including Dr. Roberto Vianna from Brazil, Dr. Marico Gonzalez Balut from Mexico, Dr. Mario Imburgia from the United Kingdom and Mr. Nikolaus Gentner from Germany. Other guest speakers were Dr. Dilip Deshpande, Dr. Anubha Agarwal, Dr. Sudarshan Govind Ranpise, Dr. Shali Rai, Dr. Nymphea Pandit and Dr. N.K. Gupta.

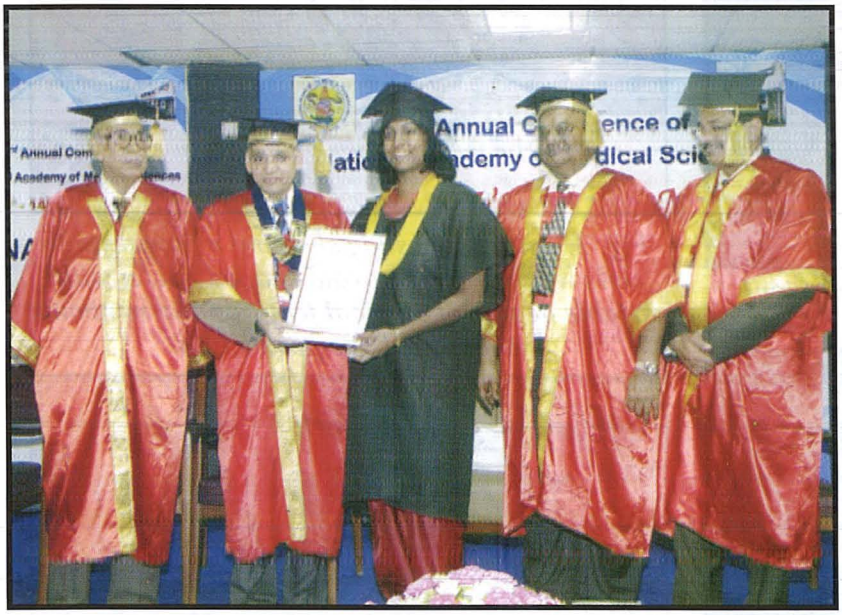
To uphold Indian culture of the 'guru-shishya' parampara four Gurukul sessions were held. Over 500 students took part in these Gurukul sessions. Gurukul lectures were delivered by Dr. Deshraj Jain, Dr. Sandhya Jain, Dr. Sanjeev Kumar, Dr. Sushmita Saxena, Dr. Himanshu Aeran, Dr. Pravin Kumar, Dr. Ajay Sing and Dr. Sanjay Kalra.

Prof. Samraj receives Prof. M. Rahamtullah Award for Research



Fellow Professor Dr. T. Samraj, Secretary of Pierre Fauchard Academy India Section and Academic Co-ordinator of Penang International Dental College, Salem being honoured by His Excellency Dr. K. Rosaiah, Governor of Tamilnadu in the 25th International Conference of the Indian Society for Dental Research with ISDR Founder President Prof. M. Rahamatullah's Award for his Outstanding Contribution in the field of Dental Research at Chennai on October 05, 2012.

Fellow Dr. Raji Viola Solomon receives NAMS Membership



Fellow Dr. Raji Viola Solomon, Professor of Conservative Dentistry and Endodontics, Panimalar Dental College, Hyderabad, receiving Membership of National Academy of Medical Sciences in the 52nd Annual Convocation of the National Academy of Medical Sciences at Chennai on October 13, 2012. Picture shows (L-R): Dr. C.S. Baskaran, President – elect of National Academy of Medical Sciences, Dr. K.K. Talwar, President of National Academy of Medical Sciences, Dr. Raji Viola Solomon, Dr. Mayilvahanan Natarajan, Vice – chancellor of Tamilnadu Dr. MGR Medical University and Dr. S. Kameswaran, Council Member of National Academy of Medical Sciences.

Attention all Fellows

Important Notice

"All Fellows are requested to send their email id, to the Secretary for early and easy communication purposes, by email to: samrajt@hotmail.com

Thank you

Best Wishes for a Prosperous New Year 2013".

T Samraj